

40 Rock (C)

POPULAR Computing WEEKLY

35p 6 January 1983 Vol 2 No 1

This Week

Spectrum software

John Scriven takes another look at some of the latest games for the ZX Spectrum. See page 12.

Data transfer

Kevin Griffiths presents a routine to transfer data from one program to another on the 16K ZX81 on page 23.

Software library

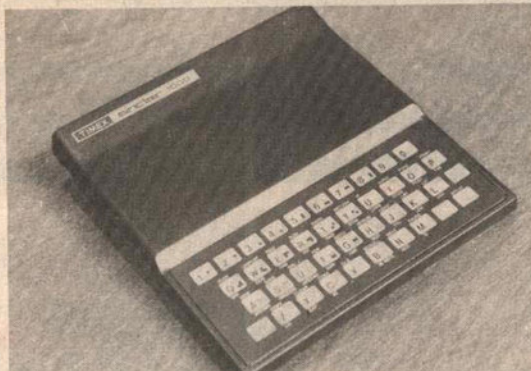
David Kelly talks to Alec Fry, founder of the Sinclair Owners' Software Library. See page 11.

Dragon graph

G Morton explains how to represent data on an x,y scale using a simple graph plotting routine on page 25.

★ STAR
Missile Command on Spectrum by Chris
★ GAME

News Desk



Timex-Sinclair 1000 — already selling well in the US.

Spectrum to go on sale in US?

A US version of the Sinclair ZX Spectrum is due to go on sale in America in the first quarter of 1983, possibly as early as January.

The machine will be marketed and sold exclusively by Timex in the US.

The American company's first product — the TS1000 (a 2K version of the ZX81) — has been a runaway success

since it was first launched in August.

Timex has now exceeded the necessary sales threshold beyond which it gains an exclusive licence to sell computer products based on Sinclair technology in North America. Under the agreement between Timex and Sinclair Research, Sinclair is now required to

Continued on page 5

Bug-Byte goes retail

BUG-BYTE is set to become the first major software house to cease trading by mail-order.

As of March the company will only be selling its range of software cassettes through retail computer shops and chain-stores.

Bug-Byte's decision to phase out mail-order selling emphasises the extent to which the micro-computer industry is now looking to the High Street for most of its trade.

"At the same time as sales to the retail trade are increasing we are seeing a dwindling mail-order demand" explained Bug-Byte co-founder Tony Milner.

"Dealing with postal sales uses up 60 percent of our workforce but only brings in about 20 percent of the turnover.

"Our last mail-order advertisement is due to appear in March and from then on we shall phase out postal selling. We are hoping that this will help our dealers — knowing that they will become our sole outlet."

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Continued on page 28

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Articles which are submitted for publication should not be more than 3,000 words long. The articles, and any accompanying programs, should be original. It is breaking the law of copyright to copy programs out of other magazines and submit them here — so please do not be tempted.

All submissions should be typed and a double space should be left between each line. Please leave wide margins.

Programs should, whenever possible, be computer printed.

We cannot guarantee to return every submitted article or program, so please keep a copy. If you want to have your program returned you must include a stamped, addressed envelope.

Accuracy

Popular Computing Weekly cannot accept any responsibility for any errors in programs we publish, although we will always try our best to make sure programs work.

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Editorial

Anyone who has ever looked inside a Sinclair printer will know that it is more complex than it appears from the outside. Anyone who has ever taken a Sinclair printer apart will testify to the difficulty of putting it back together.

The Sinclair printer is a mass of little white plastic wheels and cogs, bestrewn with wires and connectors. The electric stylus, which burns through Sinclair's aluminised paper to form letters and characters, is attached to a whirling rubber band.

But, for all the intricacy of the Sinclair printer's design, the end result is at best barely adequate. Burnt carbon from the aluminised paper tends to clog up the works, causing already faint listings to become completely illegible.

Mind you, even at £59.95 the Sinclair printer is still considerably cheaper than its rivals, so it is perhaps a little unfair to expect pristine copy every time.

But everyone who has suffered from the vagaries of the Sinclair printer will be glad to know that Sinclair is rumoured to be working on a four colour printer that will sell for around £70. I should emphasise that this is only a rumour, though Sinclair is known to be developing a printer of some sort. I shall await its appearance with anticipation.

Next Thursday

At last the mystery can be revealed. **Battlestar**, a unique computer-moderated, play-by-mail game, starts next week. To enter **Battlestar**, a game which is exclusive to readers of *Popular Computing Weekly*, simply buy next week's copy.

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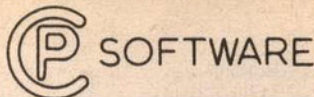
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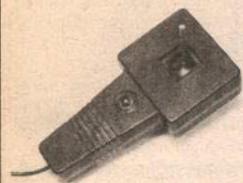
US Spectrum

Continued from page 1
wind up its US computer selling operation.

The American division of Sinclair placed its last computer advertisement in September and was then given 90 days to conclude all outstanding business. But Sinclair's US office will be retained to market the company's flat-screen tv, when it becomes available.

A spokesman for Sinclair Research commented: "The Timex licence is now fully exclusive in the North American market and sales of Sinclair's own-brand computers there are now prohibited.

"The decision to sell a version of the Spectrum over there is ultimately Timex's but it must happen in the first quarter of 1983, possibly early in January."



Midwich joystick.

Joysticks from Midwich

MIDWICH Computers has introduced a range of joystick units to its add-on collection.

For use with the Dragon 32, Acorn, BBC, ZX81 and Spectrum machines, the analogue joystick potentiometers have a life expectancy in excess of 200,000 operations.

Since neither of the Sinclair machines are provided with a built-in analogue/digital converter, Midwich has also produced a high-speed joystick controller board.

The units are available from Midwich Computers, Rickinghall House, Hinderclay Road, Rickinghall, Suffolk and are priced as follows (including VAT): Dragon 32, £15.98 per pair; Acorn BBC, £13.00 per pair; ZX81/Spectrum, £15.98 per pair.

Dragon lament

A SMALL bug crept into the Dragon *Singalong* program in our December 16/23 issue. Line 40 should have read:
40 CLS:X\$=" ABCDEFG"

Imagine software

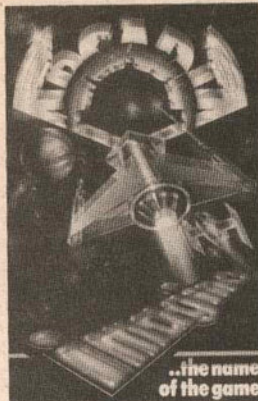
SENIOR staff at the Liverpool-based software company Bug-Byte have broken away to set up their own firm.

Dave Lawson, former software manager at Bug-Byte, and Mark Butler, until recently sales manager at Bug-Byte, have formed a new company — Imagine Software. Also involved in the new venture is Bug-Byte's former head programmer, Eugene Evans.

The first fruits of Imagine Software have appeared in the form of *Arcadia*, a new game for the Spectrum and Vic20. Two more games will follow on January 14.

"What we are doing now is entirely different from Bug-Byte," said Dave Lawson. "We hope to be able to produce at least two new games each month — and all our software will be original rather than versions of existing arcade games."

At the moment Imagine software is available only by mail order. By the end of January, however, the program will be available in the high street chain stores and



specialised computer shops.

Bug-Byte remains undaunted by the departures.

"I gather some of our old people have set up an outfit just up the road," said Bug-Byte's Tony Milner. "We are not at all worried — if anything we have become more efficient since they left.

"We're still good friends. They are not any competition yet but it will keep us on our toes," he said.

Young Computer Brain 1982



Derek Reynolds (left) and Peter Hall.

A FOURTEEN-year-old schoolboy from Newcastle-upon-Tyne has been chosen as Young Computer Brain of 1982.

Derek Reynolds' winning program — designed to help handicapped people to teach themselves to use a computer — was selected from over 320 entries. As the winner he receives £2,000-worth of computer equipment from Commodore Business Machines and a trophy from the *Sunday Times Magazine*, joint sponsors of the event. The trophy was presented by Peter Hall,

Chairman of the Council of the British Computer Society at a ceremony held on December 13.

The competition was divided into three classes. Derek Reynolds was also chosen as winner in the 13-14 age section.

Rachael Goberman from Oldham won first prize in the under 13s category for her entry on how computer-aided design could be applied to police Identikit methods. Lionel Tun from Mitcham won the 16-18 section with a program to provide computerised sleep therapy.

The aim of the competition, held every year, is to encourage young people to use computers to benefit society.

Scottish show

THE *Personal Computer World Show* is travelling north.

The *Scottish Personal Computer World Show* is to be held on April 16-18 (Saturday to Monday) at the MacRobert Pavilion, Ingliston, Edinburgh. More details from Jenny King on 01-486 1951.

High Street training is 'essential'

DEREK Moon, managing director of Currys Micro Systems has hit out against selling microcomputers without specialist sales staff and aftersales support.

"The market is not ready for cash and carry computers," he said. "Uncontrolled selling of home computers will cause retailers problems they haven't begun to imagine. If the shop staff are ill-informed or misinformed there will be a queue of customers dissatisfied with the retailer and disenchanted with the idea of home computing."

In line with this thinking Currys will only at present be selling microcomputers in high street branches in proximity to their nine Micro-C specialist computer shops. This will ensure that customers will not have to go far to sort out any problems they may have. By the New Year 37 of Currys's 512 branches will be selling micros.

● Dixons is to send over 300 of its staff on a two-day intensive microcomputer training course. The 20-hour scheme will teach computer selling and also simple program writing. Dixons already sell the Commodore Vic20 computer and will shortly begin sale of the Computers Lynx.

Dragon schools' software

DRAGON Data plans a move into the educational software market early in the new year.

Initially the company is to produce a range of programs aimed at 4- to 11-year-olds. The software will be split into two groups devoted to teaching numeracy and literacy.

Later the catalogue will be extended with material for the 12- to 15-year-old range.

This expansion into educational software is to complement the company's plans to produce a schools version of its Dragon32 microcomputer. The model, which will have a built-in RGB monitor and cassette player, is currently under development.

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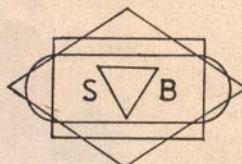
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Joining the majority

Re 'The Monkey Puzzle', November 18, page 35: If the question was formulated by Seymour Papert exactly as quoted by your contributor, then it is not surprising that three-quarters of the students asked by Papert gave 'wrong' answers. As the question stands, the answer given as correct (that the rock goes up), is actually incorrect.

You stated that the monkey and the rock are of equal weight. In this case, in order to balance one another, as also stated, *both* must be resting partly on the ground; or *both* must be completely clear of the ground. The question asks whether the rock moves up, or down, or stays still, thus implying that it is free to move down, which means that it cannot be resting, even partly, on the ground. This means, in turn, that the monkey also must be completely clear of the ground, with the *whole* of its weight already on the rope.

Starting to climb up the rope will have no effect on the weight of either monkey or rock, so the rock will stay where it is.

S Kane
66 Haw Road
Co Antrim

Boris Allan replies: by pulling on the rock (to raise himself) the monkey effectively applies a turning force to the pulley (ie a "couple") and thus the rock rises. The solution is a case of action/reaction, and the monkey rises at exactly the same rate as the rock.

On a winning ticket

May I express through your columns, my thanks to David Lawrence for his *Working Spectrum*, a copy of which arrived this morning (November 17). As I ordered it on November 12, this must set something of a record in the world of micro-computers.

On a first swift look through the book it would appear to be invaluable and credit must also go to the designer for the very clear way in which the information is presented. No large chunks of indigestible text.

Thank you and the team for *Popular Computing Weekly*,

I'm a committed fan and look forward to each issue.

Marion Taylor
504 Ben Jonson House
Barbican
London EC2Y 8DL

Niggardly bug examples

Dare I say that the examples of Spectrum bugs offered by your correspondents (so far) have been niggardly, almost insignificant examples.

This one produces an entire incomprehensible screen display. First enter:

```
10 PRINT "xxxx"; GOTO 10 and
RUN it.
```

The screen will fill up and the computer stops to ask *Scroll?* Press both shift keys together and then *Enter*.

Can anyone tell me what's going on?

John Bloxham
18 Lea Close
Stratford-upon-Avon,
Warwickshire CV37 9JS

When a bug is not a bug

David Edwards's Spectrum "bug" reported in your December 9 issue is not only not a bug, it is actually documented on page 114 of the Spectrum manual, which fully explains the phenomenon.

For the uninitiated, 6 in extended mode generates a "paper yellow" control code sequence, ie *Chr\$17 + Chr\$6*. Pressing *Delete* once deletes the *Chr\$17* leaving *Chr\$6*, which reference to the character code chart on page 183 will show is the control character corresponding to a comma in a *Print* statement, hence the cursor moves to column 16.

None of the other colour codes (0-5 and 7) have any meaning to the tv display, hence they are displayed as a question mark.

All this does is illustrate the interesting fact that *Delete* works on control code sequences starting with the first code and working through to the last, rather than the other way round as with normal displayed characters. Incidentally 9 in extended mode sets the *Bright* attribute, not colour white as stated by Mr Edwards.

There seem to be very few "real" bugs in the Spectrum, most of those reported are interesting quirks with little or no practical significance. My contribution to the "real but avoidable" category is that *Clear* does not do a *Restore*, contrary to the manual. This problem is overcome by the good practice of putting a *Restore* before any critical *Read* statements.

Kevin Gordon
41 Fennel Crescent
Broadfield
Crawley
West Sussex

Bugged up and interesting

I think I have found another bug in the Spectrum — an interesting one. Normally when the computer gives an error code, the cursor disappears. Then, when a key is pressed, the message disappears and the cursor reappears. But the following program gives a different result:

```
10 INPUT 3: a$
```

When the program is run, the error message "J Invalid I/O device, 10:1" is given — but the cursor appears at the end! Any typing done then will appear on screen at the same time as the error report, which cannot be deleted. This does not disappear until *Enter* is pressed, when the message is removed before syntax checking starts.

Has anyone else noticed this fault? It seems to arise from the fact that you are telling it to accept data from the printer rather than the keyboard.

Bill Longley
388 Ipswich Road
Colchester
Essex CO4 4EX

In a minority with only 16K

As a reader of your magazine since No 1, I wonder if you (or anyone else) can explain to me why the authors of programs, and especially software companies who retail the various program cassettes, always assume that the maximum capacity of the ZX81 is only 16K.

I have a ZX81 32K. There must be many thousands like me, and also many thousands with 64K Ram packs, yet there

do not seem to be any cassettes on the market to take advantage of this.

The real reason I am writing is that recently I purchased a ZX81 machine code compiler only to find out that it just had variables A-Z, no strings and no arrays unless you used *Peek* and *Poke*.

As I wanted it to process the loops in programs using strings and arrays, but am not too familiar with the *Poke* command, the compiler couldn't help me a lot. The reason given in the instruction leaflet was lack of space as the ZX81 only had 16K Ram.

I would like to gamble that if a check could be made on all ZX81 users throughout the country that the 16K Rammers would be in the minority.

J Ashbourne
212 Cherry Sutton
Hough Green
Widnes

A moot point. It is a gamble I would like to take, but the thought of conducting a nationwide survey of ZX81 owners is a little daunting.

If you feel 16K owners are a majority/minority, please let us know.

Request for Vic adventures

After seeing the letter in your September 23 issue about Vic adventure games, my friends and I decided to write to you asking for some.

We all own Vics and enjoy buying your magazine a lot.

A M Smith
E Midwinter
P Eastman
N Oakly
21 Willingdon Park Drive
Eastbourne
East Sussex

There was not a massive response to our request for Vic adventures, but there was enough interest to justify further action. We hope to run an adventure feature some time in the New Year.

If you have an opinion you want to express, or have spotted an error that needs correcting, write to: Letters, Popular Computing Weekly, Hobbouse Court, 19 Whitcomb Street, London WC2.

Missile command

A new game for the 16K Spectrum by Chris Wood

After a visit down my local arcade for ideas for games for my ZX Spectrum, I decided that *Missile Command* would be fast enough in basic. Below is an outline of the program.

Lines
10 to 23 Set colours, and print instructions. Line 20 makes the cursor into the word *Continue* to look neater.
24 to 38 Creates the user definable graphics. Run when you get this far so that you know which ones to put in lines later.
40 to 85 Defines the remaining variables and sets up the screen. Line 47 enables you to print on line 22.
90 to 140 The main game routine. Line 130 sends the program to the subroutine at 200 to check if a missile has been shot down if the 1(one) key has been pressed and there is still some ammunition.
150 Scans the *Attributes* of the cities on line 20 to see if they have been hit by missiles.

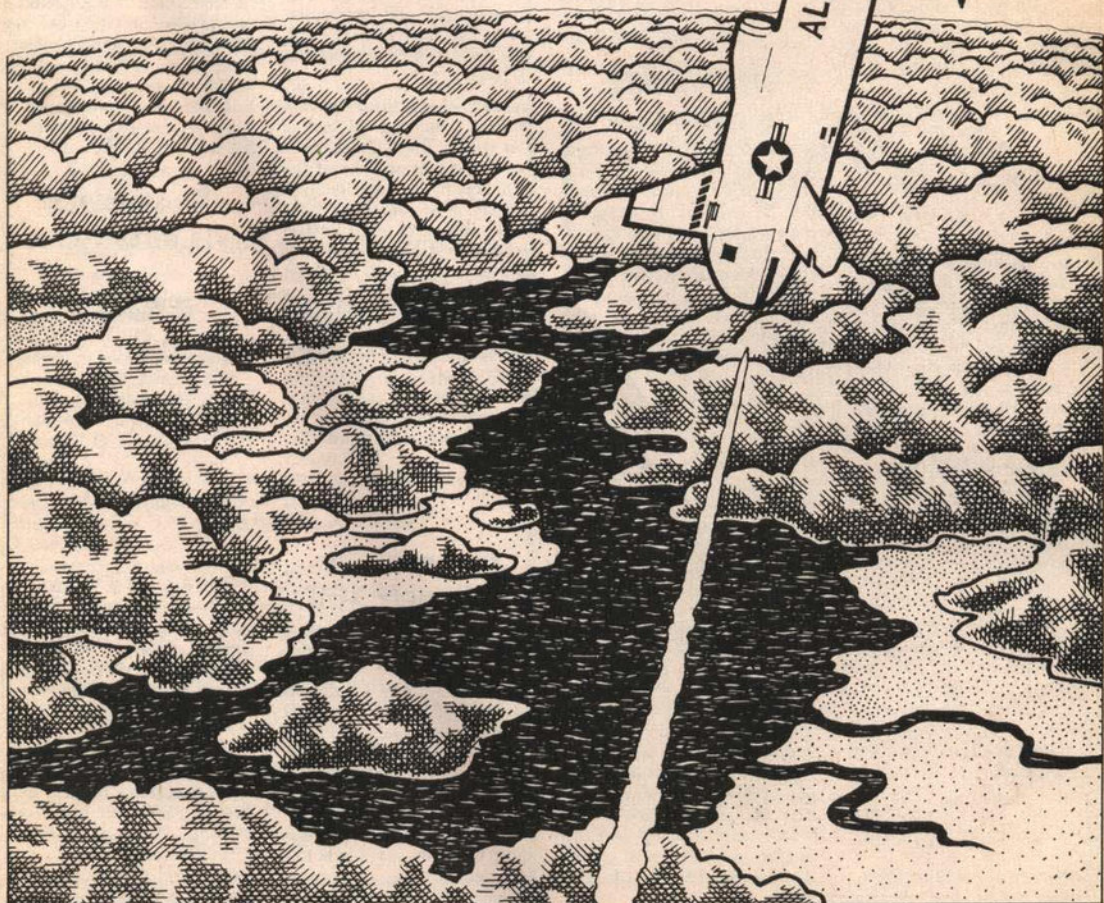
170 Sends the program to the 'enemy satellite' routine at 400.

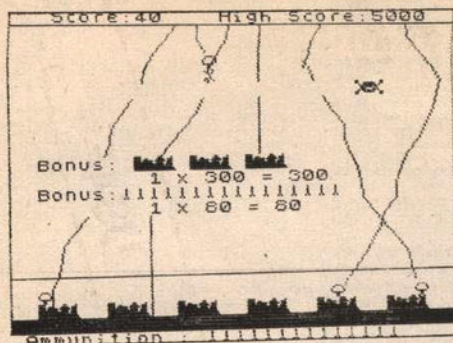
171 to 194 Works out the bonus for the remaining ammunition and cities according to the wave attack number.

200 Checks to see if a missile has been correctly hit; if it has it decreases the number of missiles by one and to ensure the correct missile is stopped the position of the last missile replaces the destroyed one. A mushroom cloud is printed at the end of the missile trace.

400 to 480 This is in effect a game on its own. It has had to be written like this to make it very fast and difficult, and to avoid clutter by putting it earlier. It is fast because the bonus is very large and there would be no point in making it too easy.

Full instructions for playing are included in the program.





Missile Command

```

10 RESTORE 0: PAPER 1: INK 7:
BORDER 6: CLS: PRINT TAB 7;"Mis
site Command" TAB 7;"
12 PRINT "An enemy power is
sending it's Intercontinen
tal Ballistic Missiles to des
troy your cities."
14 PRINT "It is up to you t
o intercept them with your la
ser cannon defense system, be
fore they level your cities."
16 PRINT "The controls are a
s follows: Up Down Left
Right Fire"
18 PRINT "You get a bonus fo
r the cities you save and yo
ur unused ammunition."
19 FOR B=1 TO 40: BEEP .1,RND*
20: NEXT B
20 POK 23617,210: INPUT FLASH
1:"PRESS ENTER TO "; LINE #$:
POKE 23617,0
22 CLS: PRINT "You canno
t go below the line" and if
you try you cannot raise yo
ur sights again. So be
careful and
23 PRINT "At the end of ea
ch wave an enemy satellite wi
ll go across the screen. If
you can aim it your automa
tic jamming transmitter will
destroy it." TAB 9;"GOOD LUCK"
24 PAUSE 500: LET HS=5000
25 POK 23659,6: LET S3=0: LET
S2=0: LET SC=0: LET BN=1
30 FOR Q=144 TO 150: FOR N=0 T
O 7: READ A: POK USR CHR$ Q+N,A
: NEXT N: NEXT Q
35 DATA 0,15,15,15,15,15,15,15,0,
240,240,247,255,255,255,255,255,
1,3,5,7,9,11,13,15,17,19,21,23,25,25,
5,25,5,4,15,8,20,15,6,10,8,25,20,25,4,
25,5,0,5,5,10,10,10,10,10,10,10,10,
38 DATA 3,22,27,24,21,16,5,18,0,2
27,3,192,199,47,27,20,45,199,192
40 LET S=0
43 PAPER 5: INK 2: BORDER 6: C
LS: PRINT AT 21,0: PAPER 4: TAB
31:
44 PRINT AT 0,0: PAPER 0;" S
core: High Score"
45 PRINT AT 0,9: PAPER 0: INK
7: SC: AT 0,26: HS
46 LET BN=BN+.5: LET R=3*(6-S)
: LET E=5
47 POK 23659,1: POK 23689,2:
PRINT AT 22,0: INK 7: PAPER 0: T
AB 31;" Ammunition:"
FOR W=1 TO R: PRINT PAPER 1:"
": NEXT W: POK 23659,2
48 PLOT 0,30: DRAW 255,0
50 LET X=10: LET Y=10: LET X1=
X: LET Y1=Y
51 PRINT AT X,Y: OVER 1: INK 0
:"X"
60 DIM B(6): FOR I=1 TO 6: LET
B(I)=-1*INT(RND*3): IF NOT B(I)
) AND I>3 THEN LET B(I)=-1
65 IF NOT B(I) AND I<3 THEN LE
T B(I)=1
70 NEXT I

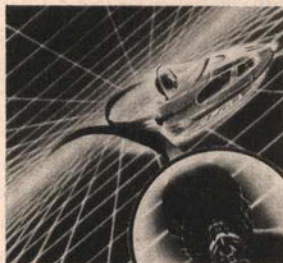
```

```

71 PRINT AT 20,0:" ";
75 FOR N=1 TO 6-S: PRINT INK 0
;"BCD "; NEXT N
80 DIM A(6): DIM D(6): FOR I=1
TO 6: LET D(I)=8: LET A(I)=167:
NEXT I
85 DIM F(6): FOR I=1 TO 6: LET
F(I)=INT(RND*40)*16-S/2+12: N
EXT I
90 FOR J=1 TO 20
95 FOR I=1 TO 6: PLOT F(I),A(I)
: DRAW B(I)*INT(RND*6),-D(I)
: LET F(I)=PEEK 23677: LET A(I)=
PEEK 23678
100 PRINT AT X1,Y1: OVER 1: INK
0:"X"
105 IF PEEK 23677<9 AND B(I)<0
THEN LET B(I)=-B(I): GO TO 115
105 IF PEEK 23677>245 AND B(I)>
0 THEN LET B(I)=-B(I): GO TO 115
110 IF INT(RND*4)=4 THEN LET B
(I)=-B(I)
115 IF X<17 THEN LET X=X+(INKEY
$="6")-(INKEY$="7")
120 LET Y=Y+(INKEY$="8")-(INKEY
$="5")
125 PRINT AT X,Y: OVER 1: INK 0
:"X": LET X1=X: LET Y1=Y
130 IF INKEY$="1" AND R>0 THEN
GO SUB 200
135 BEEP .001,45-J/2
140 NEXT I: NEXT J
150 FOR N=2 TO 27-(5*S) STEP 5:
FOR Q=0 TO 2: IF ATTR(20,N+Q)=
42 THEN LET S=S+1: PRINT AT 19,N
+Q: INK 7: FLASH 1:"E": NEXT N
IF N>27-(5*(S-1)) THEN GO TO 170
160 NEXT Q: NEXT N
170 GO SUB 400
171 PRINT AT 10,2:"Bonus:";: FO
R U=1 TO 6-S: PRINT INK 0: BE
EP .1: BEEP .25,6-U: LET S2=S2+100
*INT(BN): NEXT U
172 PRINT TAB 10:INT(BN);" X
":Y:1:00="S2
175 PRINT AT 12,2:"Bonus:";: FO
R U=1 TO 6: PRINT INK 0:1: BEE
P .1,-10: LET S3=S3+5*INT(BN)
: NEXT U
176 PRINT TAB 10:INT(BN);" X
":Y:5:="S3
177 LET SC=SC+S2+S3: LET S2=0:
LET S3=0
178 IF SC>HS THEN LET HS=SC
180 IF S=6 THEN GO TO 190
185 FOR U=1 TO 200: NEXT U: GO
TO 43
190 PRINT PAPER 0: INK 7: AT 0,9
: SC: AT 0,26: HS: FOR G=1 TO 48: B
EEP .01,G: BEEP .01,48-G: NEXT G
INPUT "Another go? (Y/N)";A$
192 IF A$="Y" THEN CLS: RESTOR
E 0: GO TO 25
194 STOP
200 LET R=R-1: POK 23659,1: PO
KE 23689,2: PRINT AT 22,12+R: PA
PER 1: POK 23659,2: BEEP .0
1,40: FOR D=1 TO 6: IF INT(F(D)
/8)=9 AND 21-INT(A(D)/8)=X TH
EN LET F(D)=F(E): BEEP .03,-10:
PRINT AT X-1,Y: INK 7: FLASH 1:"
E": LET E=E-1: LET SC=SC+INT(BN)
*20: PRINT AT 0,9: PAPER 0: INK
7: SC
205 NEXT D
210 RETURN
400 PRINT AT X,Y: OVER 0:" ": L
ET X2=INT(RND*10)+3: LET X=10:
LET Y=10: LET X1=X: LET Y1=Y
405 FOR K=1 TO 29: PRINT AT X2,
Y: "GF"
406 PRINT AT X1,Y1: OVER 1: INK
7:"X"
410 IF Y<28 THEN LET Y=Y+(INKEY
$="8")-(INKEY$="5")
420 IF X<17 THEN LET X=X+(INKEY
$="6")-(INKEY$="7")
430 PRINT AT X1,Y1: OVER 1: INK
7:"X": LET X1=X: LET Y1=Y
440 IF X1=X2 AND Y1=K+2 THEN GO
TO 460
445 IF X1=X2 AND Y1=K+1 THEN GO
TO 460
450 NEXT K: PRINT AT X2,29:"
455 RETURN
460 PRINT AT X2,K+1: FLASH 1:"E"
E"
470 LET SC=SC+500*INT(BN)
475 PAUSE 50
480 RETURN
1000 FOR N=0 TO 7: PRINT PEEK(U
SR "F"+N): NEXT N

```


BEST OF POPULAR Computing WEEKLY



Four of the top Spectrum and ZX81 games from *Popular Computing Weekly* on sale on one cassette at a special price of only £4.45 inc p&p. **Laserchase**, by Simon Lane. This top game for the 16K Spectrum now has the added feature of a Bomb facility.

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Alec Fry, at work with some of his staff.

At the library in Liss

David Kelly talks to Alec Fry, founder of the Sinclair Owners' Software Library.

Mention the idea of a software library to some software producers and they turn purple and have to be restrained. They see the library as an institution set up specifically to deprive them of sales.

Other software companies are content to coexist with libraries and take an altogether different view.

Alec Fry runs one such venture — the Sinclair Owners' Software Library, based in deepest Hampshire. After only six months — the service started in July 1982 — the library has over 1,000 members and has more than 150 ZX81 and ZX Spectrum titles for hire.

"Last Easter I bought a ZX81," says Alec, "and I quickly realised that it was easy to spend as much on software as on the machine.

"So it seemed like a good idea to build up a stock of programs and start a library — I was surprised that nobody had done it before."

Membership of the Sinclair Owner's Software Library costs £8.50 or £9.50 a year, depending on whether you wish to hire ZX81 or Spectrum cassettes. For this you get a quarterly newsletter, a library catalogue and your first order form. In addition to the membership fee, a charge is made every time a tape is loaned out.

The library has to keep more than one copy of many of its titles. There are as many as 20 copies of some of the most popular cassettes.

Each cassette has a surprisingly short life. "Usually a cassette won't last much more than 15 or so lendings," says Alec. "By that time someone has creased the tape or it gets damaged in the post."

Each cassette is loaned for a two-week period but, in practice, most are returned before the time expires. Just like a book library, every cassette has an accompanying card stamped with its return dates.

Looking at these it is easy to see that the library stock seldom languishes on the shelves — tapes are often taken out and returned several times a month.

"When members return their programs we encourage them to give it a score. These assessments are then fed into my ZX81 and we compile a top 20 list of cassettes — based on how the members rate the programs rather than on the number of times it is taken out. The ones most in demand do not necessarily get the highest score.

Most members hire new tapes immediately after returning the old ones. This means over 50 returns every day. So the library now employs three people part-time, as well as Alec and his wife Erna.

"Nearly all our tapes are out on hire at any one time — if we have tapes on our shelves they tend to be the 1K ZX81 programs. At the moment adventures are going well and we get a lot of demand for Spectrum utilities."

To a software house the main headache a library throws up is that of illegal duplicating. Copying cassettes while they are out on hire is a very difficult problem to control.

"To start with I wasn't sure what sort of reactions we would get from software suppliers. I made one or two tentative enquiries before we set up the library and those software companies we spoke to seemed quite happy with our idea.

"Our service operates just like any other lending library — it's all perfectly legitimate. In fact, many public lending libraries now offer a music cassette lending facility — the local library in Liss certainly does. We are only doing the same with computer cassettes.

"At first all the money we earned went into building up our catalogue. We soon discovered there was a big demand for what we were doing. Luckily, all my business experience has been in mail-order. For the last 16 years I have been the managing director of a photographic supplies mail-order company.

"I knew roughly what we would be in for if the library turned out to be a success. If I had not been prepared we would certainly have been swamped — we are still getting 50 to 60 new members per week!

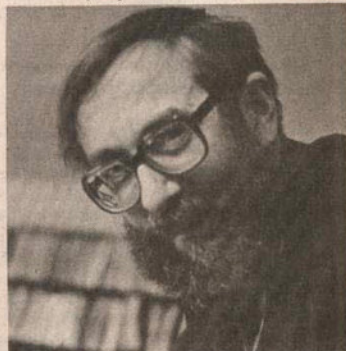
"We cater equally for ZX81 and Spectrum owners — in fact our membership is split right down the middle. Our range of ZX81 programs is greater, simply because the machine has been around longer.

"We choose which tapes we stock. There is often more than one program that does' much the same thing, particularly with utilities. Selection is made on the basis of manufacturer's literature and all our main suppliers keep us informed of new products.

"Of course there are a few suppliers who just don't want to know about software libraries. Some state on the cassette that it may not be hired out.

"We always make our intentions clear when ordering tapes for the library. Of all the companies we have contacted, only eight will not sell to us — and we respect that view. In such cases we simply do not have those programs in our library.

"All the tapes we hire out are bought from the manufacturer and many companies regard us as a good customer because of the quantities we buy. We could never stock all of the material from each company. If a member hires a tape



Luckily, all his business experience has been in mail order.

from us and likes it then he or she may well go out and buy it for themselves. Alternatively, they may find that the programs from a particular company are very good and, when they have a new product, buy it.

"Obviously we discourage them from illegally making copies. Many of our suppliers send us special versions of their programs which auto-run and cannot be saved.

"It is a rule of membership that library cassettes must not be duplicated.

"It has been suggested that we should pay a royalty to software companies. A figure of 20 percent has been mentioned which would be ludicrous — it would be more than the hire fee.

"The software houses get their cut anyway — both on the new tapes we buy and on the replacements bought later. I'm sure tapes wear out much more quickly than books do in public libraries."

Escape!

John Scriven finds out whether the latest Spectrum games are good enough to save you money in the arcades.

A friend of mine said last year that he'd recently bought a micro to save money. On enquiring how this might be achieved, I was surprised to discover that it was not to help with home finances, producing sales graphs or calculating odds on football pools. He had calculated that he spent £1.50 on video games every time he visited his local hostelry.

If he were to buy a ZX81, he could stay in and play arcade games and, in less than four months, he'd have saved himself the purchase price. Needless to say, he was back at the 20p slot within a month, disillusioned with the standard of the games he'd acquired.

Most were in Basic, very slow and could not compete with the colour and sound of the real thing. In the 18 months since this happened, micros have advanced considerably. The speed has been improved by the use of machine code in many games.

This review will consider how far the successor to the ZX81, the Spectrum, can emulate the original arcade games, or even surpass them.

There are several games based on the Pacman theme as well as one or two Invader look-alikes. It would be pleasant to find rather more innovation in game concepts, but it seems the great British arcade-playing public prefers tried and tested ideas and new games take time to catch on.

Mazeman from Abersoft is a maze-pursuit game that involves eating dots while avoiding four little ghosts who pursue you. If you've recently eaten a power pill, the hunters become the hunted for about eight seconds. Tackling them gives you extra points. There is on-screen display of men left, screens eaten, individual score and hi-score. On the whole it is a competent high-speed version but the choice of cursor control keys for movement, although logical, does not make for ease of playing.

Spookyman from Abbex is similar in concept to *Mazeman* and does have the advantage of easier control keys. In fact any key in the top row of the keyboard moves your player up, the bottom row moves it downwards, and the middle two rows are divided in half for left and right movement. This means you can select which keys are most suitable for you.

The reason why this is preferable to the cursor keys is that the movement on the screen is related to the geographical positions on the keyboard. It is more suitable for high-speed action games. The answer,



John Scriven, games evaluator.

of course, is to use joysticks, and few games mention this facility.

This will doubtless change in 1983 when Sinclair, as well as Kempston, produce a joystick. *Spookyman* is very fast and does have a one- or two-player option, although all your turns have to be taken consecutively.

Spectres is the Bugbyte maze game and is similar to the two previous games. The graphics are more advanced and there is the entertaining story of Eddie the electrician trying to turn the lights on in a haunted house. But it is still a Pacman sheep in wolf's clothing. This is a fine product, but at £8, it is £3 more than the other two games, and as such, rather over-priced.

In its newly-announced collection of



software, Sinclair has included what appears to be yet another Pacman in the guise of *Hungry Horace*. It is soon clear, however, that a spark of originality lifts this game above run-of-the-mill maze games.

The maze has bridges and tunnels, an exit and an entrance through which an endearing little man appears. He has to be steered round, munching fruit that occasionally appears, while you avoid purple guards. If you reach what appears to be a bell, you can temporarily turn the tables on the guards and chase them. Should you negotiate the first maze successfully, there are three others that increase in complexity, the last one leading back to the first, but with an increase in difficulty. There is a sensible choice for movement keys and the sound of munching is very realistic.

This is one of the best Spectrum games and very addictive. It is noticeable that all

the Sinclair cassettes produced in conjunction with Psion are easily loaded and well-written.

New Generation Software has managed to achieve a maze game (*Escape*) that is both original and entertaining. The maze appears viewed from an angle of 45°, giving a 3-D effect. Vertical paths are obvious, horizontal ones often obscured by hedges. Difficulty is selectable from 1 to 5, and the object is to find a hidden axe and use it to batter down the exit.

No problem, you may think, except that dinosaurs (the same number as the difficulty level) pursue you. The graphics are excellent, especially a horrifying pterodrom from which it is almost impossible to escape. Top scores are recorded, as is the time taken. My one criticism is the familiar difficulty of using the cursor keys for control.

There are two versions of *Asteroids*: *Planetoids* from Sinclair/Psion, and *Meteoroids* from Softek. The original arcade game provided you with a small triangular spaceship in the centre of the screen. Two buttons controlled rotation, and two more thrust and lasers. A panic button could hyperspace you to another part of the video universe.

The main enemy consisted of large chunks of interplanetary detritus that broke up until they were eventually vaporised. Additional excitement was provided by enemy saucers that shot at you. Avoiding this collection while destroying it was a challenge, but the graphics belonged to an earlier generation of arcade money-spinners.

Planetoids copies the original faithfully, but uses the user-defined graphics facility to produce a much more life-like ship. Unfortunately the movement is not realistic, being both jerky and too easy to control. The original needed great skill to learn to use reverse thrust to prevent the ship careering off screen.

Softek's version suffers from a similar disregard for the laws of physics and has a simpler spacecraft. The meteoroids, however, are very solid in appearance and the game is more involved than Sinclair's, having shield and movement for protection. There is also the option to temporarily halt the game while you do the washing-up, the gardening or your homework without destroying your brilliant score. These are two versions of a rather dated game. Softek just wins on points. Sinclair's version does have a short game called *Missile* on the reverse which probably makes them of equal value.

Next come the obligatory versions of *Space Invaders* (yawn!), one from Sinclair/Psion, *Space Raiders*, and one from Quicksilver, *Space Intruders*. Both include banks of invaders, laser cannons and buildings to shelter beneath. Sinclair's game has better graphics but is painfully slow. Quicksilver's version produces neat little invaders but rather simplistic ground shelters that disappear in big chunks and



cannot be used to fire through. This was a favourite trick on the arcade version. It is, however, fast enough to keep you awake during play, which is more than can be said for Space Invaders.

Another game that involves protecting a base from falling objects is *Rox III* from Llamasoft. You will need plenty of practice with this game to become proficient at destroying meteors as they crash near your moon base. Unfortunately, the advertising calls these Cruise missiles, which is factually incorrect — Lunar ballistic missiles would be more accurate — and in any case probably offends the not inconsiderable number of unilateralists in this country. The game itself is exciting and well written, as well as being good value at only £2.95.

Two games that push the potential of the Spectrum to its limits both originate from Silversoft. Perhaps "originate" is not the best word as they are both extremely good copies of complex arcade games. *Ground Attack* is a version of Scramble, in which you negotiate a tortuous tunnel system, bombing fuel dumps and shooting at rockets. There are controls for up, down, and sideways movement as well as bombs and laser buttons. It is a test of real dexterity to cope with the later stages of the tunnel. Good value at £5.95.

Silversoft's *Orbiter* seems to have reached the limits of Spectrum graphics. It reproduces almost all the features of *Defender* and is only slightly slower. The attack waves are all there, complete with little men, mutants, aliens, cluster bombs and the ability to fly to the left or the right. There is also the small radar screen at the top to show what sort of nasties are approaching.

I even found that using *Orbiter* for a few days improved my score on the arcade version. My small criticism is that there was no provision for a table of best scores. I'm sure that a great incentive to play arcade games is the ability to flash your name to all and sundry when you reach the top ten. Notwithstanding this, it's well worth £5.95.

There are two recently released games that attempt to boldly go where no arcade games have gone before. *Cosmos*, from Abbex, puts you at the controls of a spacecraft defending a convoy from the ravages of marauding aliens and the odd meteoroid. A radar screen in the corner of the main screen shows your relative position while the rest of the screen is taken up with the view from the cockpit.

Rushing into the game without studying the clear, on-screen instructions caused me to blast away at my own convoy, thus scoring the minimum points in about 10 seconds flat. The next time, I took more care to explore the possibilities of the game. Although novel in concept, I felt it lacked the speed one expects from this type of game. It is interesting enough, however, to find a place in many people's collections.

Time-Gate from Quicksilva is described as a "4-D adventure". It is the most complicated cassette that is reviewed here, and contains not only the program of the game, but also a short training prog-

ram explaining the scenario and the use of the controls. This is obligatory viewing otherwise you will not have the faintest idea what is happening.

The sleeve notes on the cassette contain the traditional Quicksilva Sci-Fi story just to put you in the right mood. To be honest, I would have preferred a list of the large number of control keys. Meanwhile, the story so far... this end of the universe has been invaded for several millennia by reptilian thugs. In order to eradicate them it is necessary to discover time-gates that lead you back to the time when they first appeared. Destroy them before they breed and mankind is saved for posterity, or at least until you run the game again.

The screen display consists of the view from the front of the craft, a galactic co-ordinate chart, and a target computer. Steering and fire controls are simplified by a keyboard template that slips over a section of the keys. There is provision for use of a joystick. It is possible to change speed, to jump to another sector of the universe, and to land on a planet to refuel.

This graphic sequence is particularly striking, as is the 3D effect as you battle it out with assorted aliens. In spite of the excellent graphics and use of screen to show spacecraft condition, I was not alone in finding the initial excitement beginning to pall as I waded back through time. Waiting to catch up with fleeing aliens was irritating.

Although I have reservations, *Time-Gate* is a complex, visually superb game that is to be commended on its novelty.

All the games here show how far home computers have progressed over the past 18 months. I wanted to show my friend with the ZX81 what he was missing, but he wasn't at home, I discovered him later in the corner of my local, scampering up video trees as he played "Donkey Kong". "Now here's a real game," he said, feeding another 20p into the slot. ■

Name	Type	Supplier	Cost	Value
<i>Planetoids/Missile</i>	A	Sinclair	£4.95	7
<i>Space Raiders</i>	I	Sinclair	£4.95	5
<i>Hungry Horace</i>	M	Sinclair	£5.95	10
<i>Spookyman</i>	M	Abbex	£4.95	7
<i>Cosmos</i>	3D	Abbex	£4.95	7
<i>Escape</i>	M	NewGen	£4.95	9
<i>Orbiter</i>	*	Silversoft	£5.95	10
<i>Ground Attack</i>	*	Silversoft	£5.95	9
<i>Meteoroids</i>	A	Softek	£4.95	7
<i>Rox III</i>	*	Llamasoft	£2.95	8
<i>Spectres</i>	M	Bugbyte	£8.00	6
<i>Space Intruders</i>	I	Quicksilva	£4.95	6
<i>Time Gate</i>	3D	Quicksilva	£6.95	7
<i>Mazeman</i>	M	Abersoft	£4.95	7

Sinclair Research, Freepost, Camberley, Surrey GU15 3BR.

Abbex, 20 Ashley Court, Gt Northway, London NW4.

New Generation Software, 16 Brendan Close, Oldland Common, Bristol BS15 6QE

Silversoft, 20 Orange Street, London WC2H 7ED.

Softek, 329 Croxted Road, London SE24.

Llamasoft, Lindon House, The Green, Tadley, Basingstoke, Hants

Quicksilva, 92 Northern Road, Southampton SO2 0PB.

Abersoft, 7 Maes Afallen, Bow Street, Dyfed.

Bugbyte, Freepost, Liverpool L3 3AB.

A — Asteroids

I — Invaders

M — Maze pursuit

3D — 3D simulation

* — see article

OPEN FORUM

Open Forum is for you to publish your programs and ideas. Take care that the listings you send in are all bug-free. Your documentation should start with a general description of the program and what it does and then give some detail of how the program is constructed. We will pay the *Program of the Week* double our new fee of £6 for each program published.

Race Maze

on ZX81

This is a games program, in which you are challenged to race your car through a complicated maze in the shortest possible time. If you are unlucky and crash, five seconds are added to your final time. At the very beginning of the program the

instructions are printed out, then the screen is cleared and the maze is printed out in fast-mode.

The movement of the car and the checking to see whether you have crashed is all done using *Peek* and *Poke*. Then the rest of the program is made up of the subroutines, one for crashing and one for printing out the end time and crashes.

```

395 LET T=0
400 FOR N=1 TO 10
401 PRINT AT 7,21;" "
402 LET T=T+1
403 NEXT N
404 PRINT AT 12,21;" " ; AT 13,21
"
405 LET U=4
406 FOR N=1 TO 14
407 PRINT AT U,25;" "
408 LET U=U+1
409 NEXT N
410 PRINT AT 8,23;" " ; AT 9,23;" "
"
411 LET U=2
412 FOR N=1 TO 15
413 PRINT AT U,25;" "
414 LET U=U+1
415 NEXT N
416 PRINT AT 4,25;" " ; AT 5,25;" "
"
417 SLOW
420 LET PI=20576
425 POKE PI,136
430 LET PI=PI+(INKEY$="S")-(INKEY$="5")+33*(INKEY$="6")-(INKEY$="E")
433 IF PEEK PI=137 THEN GOSUB 3000
435 IF PEEK PI=136 THEN GOTO 600
440 IF PEEK PI=8 THEN GOSUB 2000
445 IF PEEK PI=3 THEN LET PI=0:PI=5 THEN LET PI=0:PI=6
447 IF PEEK PI=131 THEN LET PI=6:PI
"
600 IF INKEY$="S" OR INKEY$="6" THEN LET C=174
601 IF INKEY$="6" OR INKEY$="S" THEN LET U=1
603 POKE PI,C
605 LET Z=Z+1
700 GOTO 425
999 STOP
1000 PRINT "
1001 RETURN
1999 STOP
3000 LET Z=Z+5
2010 LET E=E+1
2020 POKE PI,Z
2025 PAUSE 30
2030 RETURN
3000 LET U=1
3001 FOR A=1 TO 20
3002 PRINT AT U,30;" "
3003 LET U=U+1
3004 NEXT A
3010 FOR N=1 TO 14
3011 PRINT AT 9,12;" "
3022 NEXT N
3025 PRINT AT 7,12;" "
3026 PRINT AT 5,12;" "
3030 PRINT AT 10,14;" "
3035 PRINT AT 11,14;" "
3040 PRINT AT 13,12;" "
3070 FOR F=1 TO 10
3080 NEXT F
3090 PRINT AT 10,14;" "
3095 PRINT AT 11,14;" "
3099 PRINT AT 13,12;" "
4000 FOR G=1 TO 10
4001 NEXT G
4005 GOTO 3050
5000 FOR N=20000 TO 30000
5010 IF PEEK N=8 THEN POKE N,128
5020 NEXT N
6010 CLS
6020 FOR N=1 TO 4
6030 FOR J=1 TO 20
6040 PRINT "BEST TIME SO FAR"
6045 SCROLL
6046 NEXT J
6047 NEXT N
6055 LET Z=Z
6058
Race Maze
by Mark Greer

```

```

5 REM "MAZE"
6 LET G=11
7 LET H=9
8 LET Z=0
9 LET A$=""
10 LET C=173
11 FRN$=""
12 PRINT AT 5,6;"THIS IS MAZE"
"
13 PRINT AT 6,0;"STEER YOUR CAR THROUGH THE MAZE"
14 PRINT AT 7,1;"USEING ARROW KEYS S,W,A,D"
15 PRINT AT 8,1;"YOU ARE SCORE D IN THE TIME IT TAKES YOU TO COVER THE COURSE"
16 PRINT AT 10,1;"5 SECS ARE A DDED TO YOUR TIME EACH TIME YOU CRASH PRESS N/L TO START"
43 INPUT T$
46 CLS
47 LET E=0
50 FOR A=1 TO 21
55 PRINT AT A,1;" "
60 NEXT A
70 LET Z=21
80 FOR A=1 TO 21
85 PRINT AT 5,31;" "
90 LET S=S+1
100 NEXT A
110 PRINT AT 0,0;" "
111 PRINT AT 21,0;" "
"
115 LET F=1
120 FOR D=1 TO 20
330 PRINT AT F,1;" "
140 LET F=F+1
150 NEXT D
160 LET K=7
170 FOR J=1 TO 14
175 PRINT AT 4,20;" "
177 PRINT AT 11,20;" "
180 PRINT AT K,12;" "
190 LET K=K+1
192 PRINT AT N,13;" "
193 PRINT AT N,13;" "
199 NEXT N
200 NEXT J
201 OR O=9 TO 12
202 PRINT AT O,14;" "
203 NEXT O
"
205 PRINT AT 10,15;" "
206 PRINT AT 11,15;" "
207 PRINT AT 6,13;" "
208 PRINT AT 3,13;" "
209 PRINT AT 12,14;" "
210 PRINT AT 1,2,8;" " ; AT 2,2,8;" " ; AT 1,2,12;" " ; AT 2,12,12;" " ; AT 2,15;" "
215 LET U=3
220 FOR L=1 TO 14
230 PRINT AT U,2;" "
235 LET U=U+1
240 NEXT U
245 PRINT AT 20,2;" "
255 LET R=2
260 FOR B=1 TO 13
265 PRINT AT 1,20;" "
267 PRINT AT 1,29;" "
270 PRINT AT A,5;" "
275 LET R=R+1
280 PRINT AT 20,6;" "
"
290 PRINT AT 19,6;" " ; AT 18,6;" "
295 PRINT AT 17,6;" " ; AT 16,6;" "
"
300 PRINT AT 19,25;" "
310 PRINT AT 3,6;" "
"
320 PRINT AT 5,10;" "
"
330 PRINT AT 16,10;" "
"
340 PRINT AT 15,19;" "
"
350 LET Y=3
355 FOR X=1 TO 18
360 PRINT AT Y,29;" "
370 LET Y=Y+1
375 NEXT X
377 PRINT AT 7,29;" " ; AT 8,29;" "
"
380 LET O=5
381 FOR N=1 TO 12
382 PRINT AT 0,8;" "
383 LET O=O+1
384 NEXT N
385 LET D=6
386 FOR K=1 TO 10
387 PRINT AT D,10;" "
388 LET D=D+1
389 NEXT K
390 PRINT AT 9,10;" " ; AT 10,10;" "

```

Hol Sin

on Spectrum

This not so ancient Chinese game will run happily on your equally not so ancient ZX Spectrum. It will require oriental patience and much eastern ingenuity.

There are no difficulty levels to choose between because there is only one level—

difficult. The instructions are included in the listing and are very comprehensive.

There are no aliens to shoot down, no mazes to get through, nor time limits to beat: all you have to beat is your own ability to think logically.

There is an old Chinese proverb which says the man who can be defeated is the man who does not try.

Program notes:

- 1 to 175 Setting up arrays and instructions.
- 185 Clears BS.
- 190 to 210 Sets up a random board.
- 230 to 260 Inputs and checks move.
- 265 to 275 Makes the move.
- 280 to 285 Checks for completion.
- 290 to 315 Displays score, asks for another game.
- 335 to 380 Special move.
- Subroutine 1130 prints reference board.
- Subroutine 1230 prints the up-to-date working board.

```

5 LET S=0: LET M=0: LET G=1:
DIM B(16): DIM BS(16)
10 INPUT "DO YOU WANT INSTRUCT
IONS? (Y/N)";A$
20 BORDER 1: CLS
25 POKE 23609,60
30 QU SUB 1130
45 IF A$="N" THEN GO TO 100
55 PRINT AT 8,0:
60 PRINT INK 7: PAPER 1:"THE B
OARD POSITIONS ARE,"RANDOMLY OC
CUPIED WITH THE "LETTERS" A TO
"O", "THE OBJECT OF THE GAME I
S,"TO REARRANGE THE LETTERS INT
O "ORDER,"BY ROTATING A GROUP
OF "FOUR LETTERS CLOCKWISE OR
"ANTICLOCKWISE," INK 0: PAPER
5:"YOU SPECIFY THE UPPER L
EFT POSITION OF THE FOUR YOU W
ISH TO ROTATE.
65 PRINT AT 21,3: PAPER 7: INK
2: BRIGHT 1:"PRESS ANY KEY TO C
ONTINUE"; PAUSE 9000: PRINT AT 4
,14: PAPER 7: INK 2:"VALID MOVES
ARE:"

```

```

70 PAPER PAPER 7: INK 1: AT 5,1
5: 1 2 3 5 6: AT 6,15: 7 9 10 11
"
75 PRINT OVER 1: FLASH 1: AT 3,
1: "AT 3,4:" ; AT 3,7:" " ; AT
4,1:" " ; AT 6,4:" " ; AT 7,7:" "
; AT 8,5:" " ; AT 5,8:" " ; AT
60 FOR I=8 TO 21: PRINT PAPER
1: AT I,0: NEXT I
85 PRINT AT 21,3: PAPER 7: INK
2: BRIGHT 1:"PRESS ANY KEY TO C
ONTINUE"; PAUSE 9000: CLS : BORD
ER 1:
90 PRINT PAPER 1: INK 7:"IF TH
E BOARD LOOKS "LIKE THIS:"-
95 FOR I=1 TO 16: LET BS(I)=CHR
R(I+64): NEXT I
100 LET BS(0)="": LET BS(16)="
": LET BS(6)="": LET BS(7)="":
105 GOSUB 320
110 PRINT PAPER 6: OVER 1: BRIG
HT 1: AT 3,3:" " ; AT 3,5:" " ; AT 4,
3:" " ; AT 4,5:" " ; PAUSE 150
115 PRINT PAPER 5: AT 3,10: INK

```

```

0: AND YOU "AT 4,10:" ; ROTATED
"AT 5,10:" ; POSITION "AT 6,10:"
"AT 7,10:" ; PRINT OVER 1: FLASH 1
"AT 3,3:" ; FOR I=0 TO 700: NEX
T I
120 PRINT PAPER 1: INK 7: AT 9,1
0:"THE BOARD" ; AT 10,10:"BECOMES
"
125 FOR I=2 TO 7: LET BS(I)=CHR
R(I+64): NEXT I
130 GO SUB 1230
145 LET O=1: PRINT PAPER 1: INK
7: AT 16,10:"AND YOU " ; AT 17,10
:"WOULD WIN "
150 PRINT AT 21,3: PAPER 7: INK
2: BRIGHT 1:"PRESS ANY KEY TO C
ONTINUE"; PAUSE 9000: CLS : BORD
ER 7:
155 CLS
160 PRINT PAPER 1: INK 7:"AN
D YOU ALSO HAVE ONE SPECIAL MOV
E,"A GAME WHICH YOU MAY OR MAY
NOT NEED,". THE SPECIAL MOV
E IS "LOWEY," TO SWAP TWO ADJAC
ENT LETTERS," IN A ROW.

```


PROGRAM OF THE WEEK

```
165 PRINT PAPER 1; INK 7; " TO
166 " TO MAKE THIS MOVE INPUT -1 AS YOU
167 " MOVE, AND YOU WILL BE " ASKED
168 " FOR THE TWO POSITIONS OF THE
169 " LETTERS YOU WISH TO EXCHANGE.
170 PRINT : PRINT PAPER 5; INK
171 " " " REMEMBER ONLY ONE SPECIAL MOVE
172 " " " " " " " " " " " " " " " " " " "
173 " " " " " " " " " " " " " " " " " "
174 " " " " " " " " " " " " " " " " " "
175 " " " " " " " " " " " " " " " " " "
176 " " " " " " " " " " " " " " " " " "
177 " " " " " " " " " " " " " " " " " "
178 " " " " " " " " " " " " " " " " " "
179 " " " " " " " " " " " " " " " " " "
180 " " " " " " " " " " " " " " " " " "
181 " " " " " " " " " " " " " " " " " "
182 " " " " " " " " " " " " " " " " " "
183 " " " " " " " " " " " " " " " " " "
184 " " " " " " " " " " " " " " " " " "
185 " " " " " " " " " " " " " " " " " "
186 " " " " " " " " " " " " " " " " " "
187 " " " " " " " " " " " " " " " " " "
188 " " " " " " " " " " " " " " " " " "
189 " " " " " " " " " " " " " " " " " "
190 " " " " " " " " " " " " " " " " " "
191 " " " " " " " " " " " " " " " " " "
192 " " " " " " " " " " " " " " " " " "
193 " " " " " " " " " " " " " " " " " "
194 " " " " " " " " " " " " " " " " " "
195 " " " " " " " " " " " " " " " " " "
```

Screen scrolls

on ZX81

The ZX81's *Scroll* and *CLS* routines are very slow, and this can be frustrating when you are trying to write fast-action games in Basic. Also the lack of lateral scrolls and a downward scroll can be quite maddening.

To get over this I have written five short machine code routines that are totally relocatable in Ram.

To work through, these routines need at least 3 1/4K of Ram.

The first listing is ready for treatment by Bug-Bytes ZXAS program — for those fortunate enough to own one. I have also given a simple Hex Loader program and a Hex Dump of the machine code, for programmers without the ZXAS program. To relocate the program just change the addresses set in line 20.

To enter the machine code type in the simple Hex loader and *Run*. Now key in the complete Hex Dump. If you make a mistake type "S" and *Run* again. When you have finished delete lines 10-130. The machine code is now held in line 2 and is ready for use.

To enter the machine code with an assembler enter line 2 as in the simple Hex loader and type in the Mnemonics. Now GOTO 9000 and then delete lines 3-9060.

If you do relocate the program, starting at address X then the call up points are as follows:

- Scroll Up = x
- Scroll Down = x + 27
- Scroll Right = x + 56
- Scroll Left = x + 85
- CLS = x + 110

The routines only scroll the first 22 lines leaving the bottom two free for scores/times to be *Poked* in and left unchanged after using the *Scrolls* or *CLS* routine.

Only one line is moved at once, like the

```
ILLEGAL MOVE- TRY AGAIN
" : GO TO 235
205 LET M=M+1; LET T=S*(I+1); LET
" : B*(I+1); LET B*(I+1)+B*(I+1); LET
" : B*(I+1)*S;
270 GO SUB 1230
275 PRINT PAPER 7; AT 19.0; " " "
" : P
" : M; MOVES
290 FOR I=1 TO 10; IF CHR$(I+6
" : " " " "
295 NEXT I
290 PRINT PAPER 1; INK 7; AT 10.
" : " " " "
275 PRINT PAPER 7; AT 19.0; "
" : M; MOVES
295 LET M1=M+M; LET B=B+1
300 INPUT "PLAY AGAIN (Y/N) ?";
" : A$;
305 IF A$(1)="" THEN GO TO 10
310 FOR A=1 TO 60; BEEP .005;A;
" : " " " "
315 PRINT PAPER 1; INK 7; AT 10.
" : " " " "
320 PRINT PAPER 7; INK 0; AT 2.0;
" : " " " "
325 FOR I=1 TO 19 STEP 4
330 PRINT PAPER 6; INK 0; " " ;B$
" : (I); B$(I+1); " " ;B$(I+2);
" : B$(I+3); B$(I+4); PLOT 4,152; DR
" : W 65.0; DRW 0; -33; DRW -65.0;
" : " " " "
335 LET S=S+1 THEN GO TO 355
340 PRINT AT 21.0;
" : " " " " " INPUT PAPER 4; INK
" : 0; " " " " " FIRST POSITION ?"; X$;
345 FOR I=1 TO LEN X$: IF CODE
" : X$(I)<43 OR CODE X$(I)>57 THEN G
" : O TO 340
350 NEXT I; LET X=X$
355 INPUT PAPER 4; INK 0; "Seco
" : nd position ? " : Y$
```

ZX81's scroll command does. It also blanks the line that is left stationary by the routines.

The Assembler Listing

Line 2 holds the machine code. Line 10 opens the assembler file. Lines 30-150 scroll the screen up by using the instruction LDIR. The routine uses registers DE, HL and BC. Lines 170-330 scroll the screen down by using LDDR. It uses registers BC, HL and DE. Lines 350-530 move the screen to the right. It uses LDDR in a different configuration to before. The registers used are A, HL, DE and BC. Lines 550-720 move the screen left.

The routine uses the instruction LDIR to do all the moving. Registers used are A, HL, DE and BC. Lines 740-890 clear the screen. By adding lines:
815 SET 7,A CB FF
820 LD (HL),A
the CLS routine can become a screen invert routine. But to do this line 2 needs one extra "X" and the RESET-PRINT POSITION routine moves up by one byte but the label system on the Assembler automatically corrects this. The registers used are HL, BC and A. Lines 910-980 are the reset print position routine. This is required by all routines otherwise some important system variables will be set incorrectly upon returning to Basic.

Line 990 closes the assembler file. Lines 9000-9060 are the assembler control program. Line 9010 should be changed if you wish to relocate the program.

I have also written a very simple demonstration program just to show one way of using the routines, but they have limitless capabilities.

```
350 FOR h=1 TO LEN Y$. IF CODE
" : Y$(h)<43 OR CODE Y$(h)>57 THEN G
" : O TO 355
355 NEXT h; LET X=X$+Y$
370 IF X<24+1 THEN X=(24-I OR X)=
" : 17 OR Y=17 AND PRINT AT 19.0; "
" : PAPER 1; INK 7; " : PAUSE 120; PRI
" : NT AT 19.0; " " : GO TO 348
375 LET S=S+1. IF S>1 THEN PRINT
" : AT 21.0; INK 2; BRIGHT 1; " : ONL
" : Y ONE SPECIAL MOVE PER GAME " : P
" : PAUSE 120; PRINT AT 21.0; " " : GO T
" : O 235
380 LET T=S*(I+1); LET B*(I+1)+B*(
" : I+1); LET B$(I+1)+B$(I+1); LET
" : B$(I+1)*S;
1230 FOR I=1 TO 16; LET B(I)=I;
" : " : PRINT
1135 FOR I=1 TO 13 STEP 4; PRINT
" : PAPER 6; TAB 1; b(i); TAB 4; b(i+1);
" : TAB 7; b(i+2); TAB 11; b(i+3); N
" : EXT
1140 PRINT PAPER 6; AT 3.12; " : DR
" : W 0; DRW 0; -33; DRW -104.0; DR
" : W 0; 33
1150 RETURN
1230 PRINT PAPER 7; INK 0; AT 12.
" : " : "
1235 FOR I=1 TO 13 STEP 4
1240 PRINT PAPER 6; INK 0; " " ;b$
" : (I); " " ;b$(I+1); " " ;b$(I+2); DR
" : AW b$(I+3); NEXT I; PLOT 0,299; DR
" : AW 0; -33; DRW -54.0; DR
" : AW 0; -33; RETURN
```

Hoi Sin
by D. Wiekowski

These routines are very flexible so have a go at adapting them to do different jobs, such as blanking the unscrolled line with a different character. It is easier to manipulate the routines if they are stored above a lowered Ramtop.

HEX DUMP OF SCREEN SCROLLS											
16514	ED	5B	0C	40	D5	21	21	00	00	00	00
16515	9B	14	03	B5	02	C5	E0	50	C1	00	00
16516	84	15	05	05	00	20	33	36	00	10	10
16517	F3	1B	0B	01	D5	00	20	20	00	00	00
16518	4D	10	05	00	00	00	00	00	00	00	00
16519	F1	1E	05	00	ED	B5	06	20	00	00	00
16520	23	34	04	00	33	10	F5	15	44	44	44
16521	0A	0A	04	00	00	00	00	00	00	00	00
16522	00	00	54	50	2B	C5	01	1F	1F	1F	1F
16523	00	ED	B5	15	1B	1B	2B	2B	2B	2B	2B
16524	C1	10	17	00	00	00	00	00	00	00	00
16525	2F	0C	40	D5	21	21	00	00	00	00	00
16526	01	1F	00	ED	B5	00	1B	1B	1B	1B	1B
16527	03	40	D5	21	21	00	00	00	00	00	00
16528	03	40	D5	21	21	00	00	00	00	00	00
16529	76	25	02	35	00	23	05	3F	3F	3F	3F
16530	00	00	00	00	F0	2A	0C	00	00	00	00
16531	00	00	00	00	00	00	00	00	00	00	00
16532	35	21	73	3E	15	70	00	00	00	00	00

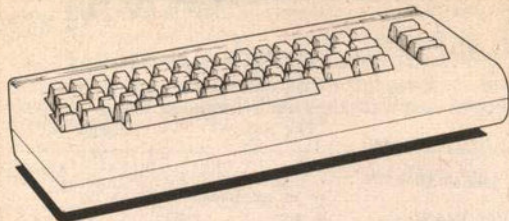
SIMPLE HEX LOADER	
2	REM < 150 "X" S >
10	FAST
20	FOR A=16514 TO 16663
30	SCREEN
40	PRINT A; " ";
50	SLOW
60	INPUT B\$
70	FAST
80	IF B\$="" THEN GOTO 50
90	IF B\$="S" THEN STOP
100	PRINT B\$
110	LET B=CODE B\$+16+CODE B\$(2)
120	POKE A, B
130	NEXT A

MACHINE CODE CALL ADDRESSES	
16514	=SCROLL UP
16541	=SCROLL DOWN
16570	=SCROLL RIGHT
16599	=SCROLL LEFT
16624	=CLS

DEMONSTRATION PROGRAM	
3	REM GOSUB 2:PRINT:GOTO 50:CLS
4	REM GOSUB 3:PRINT:GOTO 50:CLS
5	REM GOSUB 4:PRINT:GOTO 50:CLS
6	REM GOSUB 5:PRINT:GOTO 50:CLS
7	REM GOSUB 6:PRINT:GOTO 50:CLS
8	REM GOSUB 7:PRINT:GOTO 50:CLS
9	REM GOSUB 8:PRINT:GOTO 50:CLS
10	REM GOSUB 9:PRINT:GOTO 50:CLS
11	REM GOSUB 10:PRINT:GOTO 50:CLS
12	REM GOSUB 11:PRINT:GOTO 50:CLS
13	REM GOSUB 12:PRINT:GOTO 50:CLS
14	REM GOSUB 13:PRINT:GOTO 50:CLS
15	REM GOSUB 14:PRINT:GOTO 50:CLS
16	REM GOSUB 15:PRINT:GOTO 50:CLS
17	REM GOSUB 16:PRINT:GOTO 50:CLS
18	REM GOSUB 17:PRINT:GOTO 50:CLS
19	REM GOSUB 18:PRINT:GOTO 50:CLS
20	REM GOSUB 19:PRINT:GOTO 50:CLS
21	REM GOSUB 20:PRINT:GOTO 50:CLS
22	REM GOSUB 21:PRINT:GOTO 50:CLS
23	REM GOSUB 22:PRINT:GOTO 50:CLS
24	REM GOSUB 23:PRINT:GOTO 50:CLS
25	REM GOSUB 24:PRINT:GOTO 50:CLS
26	REM GOSUB 25:PRINT:GOTO 50:CLS
27	REM GOSUB 26:PRINT:GOTO 50:CLS
28	REM GOSUB 27:PRINT:GOTO 50:CLS
29	REM GOSUB 28:PRINT:GOTO 50:CLS
30	REM GOSUB 29:PRINT:GOTO 50:CLS
31	REM GOSUB 30:PRINT:GOTO 50:CLS
32	REM GOSUB 31:PRINT:GOTO 50:CLS
33	REM GOSUB 32:PRINT:GOTO 50:CLS
34	REM GOSUB 33:PRINT:GOTO 50:CLS
35	REM GOSUB 34:PRINT:GOTO 50:CLS
36	REM GOSUB 35:PRINT:GOTO 50:CLS
37	REM GOSUB 36:PRINT:GOTO 50:CLS
38	REM GOSUB 37:PRINT:GOTO 50:CLS
39	REM GOSUB 38:PRINT:GOTO 50:CLS
40	REM GOSUB 39:PRINT:GOTO 50:CLS
41	REM GOSUB 40:PRINT:GOTO 50:CLS
42	REM GOSUB 41:PRINT:GOTO 50:CLS
43	REM GOSUB 42:PRINT:GOTO 50:CLS
44	REM GOSUB 43:PRINT:GOTO 50:CLS
45	REM GOSUB 44:PRINT:GOTO 50:CLS
46	REM GOSUB 45:PRINT:GOTO 50:CLS
47	REM GOSUB 46:PRINT:GOTO 50:CLS
48	REM GOSUB 47:PRINT:GOTO 50:CLS
49	REM GOSUB 48:PRINT:GOTO 50:CLS
50	REM GOSUB 49:PRINT:GOTO 50:CLS
51	REM GOSUB 50:PRINT:GOTO 50:CLS
52	REM GOSUB 51:PRINT:GOTO 50:CLS
53	REM GOSUB 52:PRINT:GOTO 50:CLS
54	REM GOSUB 53:PRINT:GOTO 50:CLS
55	REM GOSUB 54:PRINT:GOTO 50:CLS
56	REM GOSUB 55:PRINT:GOTO 50:CLS
57	REM GOSUB 56:PRINT:GOTO 50:CLS
58	REM GOSUB 57:PRINT:GOTO 50:CLS
59	REM GOSUB 58:PRINT:GOTO 50:CLS
60	REM GOSUB 59:PRINT:GOTO 50:CLS
61	REM GOSUB 60:PRINT:GOTO 50:CLS
62	REM GOSUB 61:PRINT:GOTO 50:CLS
63	REM GOSUB 62:PRINT:GOTO 50:CLS
64	REM GOSUB 63:PRINT:GOTO 50:CLS
65	REM GOSUB 64:PRINT:GOTO 50:CLS
66	REM GOSUB 65:PRINT:GOTO 50:CLS
67	REM GOSUB 66:PRINT:GOTO 50:CLS
68	REM GOSUB 67:PRINT:GOTO 50:CLS
69	REM GOSUB 68:PRINT:GOTO 50:CLS
70	REM GOSUB 69:PRINT:GOTO 50:CLS
71	REM GOSUB 70:PRINT:GOTO 50:CLS
72	REM GOSUB 71:PRINT:GOTO 50:CLS
73	REM GOSUB 72:PRINT:GOTO 50:CLS
74	REM GOSUB 73:PRINT:GOTO 50:CLS
75	REM GOSUB 74:PRINT:GOTO 50:CLS
76	REM GOSUB 75:PRINT:GOTO 50:CLS
77	REM GOSUB 76:PRINT:GOTO 50:CLS
78	REM GOSUB 77:PRINT:GOTO 50:CLS
79	REM GOSUB 78:PRINT:GOTO 50:CLS
80	REM GOSUB 79:PRINT:GOTO 50:CLS
81	REM GOSUB 80:PRINT:GOTO 50:CLS
82	REM GOSUB 81:PRINT:GOTO 50:CLS
83	REM GOSUB 82:PRINT:GOTO 50:CLS
84	REM GOSUB 83:PRINT:GOTO 50:CLS
85	REM GOSUB 84:PRINT:GOTO 50:CLS
86	REM GOSUB 85:PRINT:GOTO 50:CLS
87	REM GOSUB 86:PRINT:GOTO 50:CLS
88	REM GOSUB 87:PRINT:GOTO 50:CLS
89	REM GOSUB 88:PRINT:GOTO 50:CLS
90	REM GOSUB 89:PRINT:GOTO 50:CLS
91	REM GOSUB 90:PRINT:GOTO 50:CLS
92	REM GOSUB 91:PRINT:GOTO 50:CLS
93	REM GOSUB 92:PRINT:GOTO 50:CLS
94	REM GOSUB 93:PRINT:GOTO 50:CLS
95	REM GOSUB 94:PRINT:GOTO 50:CLS
96	REM GOSUB 95:PRINT:GOTO 50:CLS
97	REM GOSUB 96:PRINT:GOTO 50:CLS
98	REM GOSUB 97:PRINT:GOTO 50:CLS
99	REM GOSUB 98:PRINT:GOTO 50:CLS
100	REM GOSUB 99:PRINT:GOTO 50:CLS
101	REM GOSUB 100:PRINT:GOTO 50:CLS
102	REM GOSUB 101:PRINT:GOTO 50:CLS
103	REM GOSUB 102:PRINT:GOTO 50:CLS
104	REM GOSUB 103:PRINT:GOTO 50:CLS
105	REM GOSUB 104:PRINT:GOTO 50:CLS
106	REM GOSUB 105:PRINT:GOTO 50:CLS
107	REM GOSUB 106:PRINT:GOTO 50:CLS
108	REM GOSUB 107:PRINT:GOTO 50:CLS
109	REM GOSUB 108:PRINT:GOTO 50:CLS
110	REM GOSUB 109:PRINT:GOTO 50:CLS
111	REM GOSUB 110:PRINT:GOTO 50:CLS
112	REM GOSUB 111:PRINT:GOTO 50:CLS
113	REM GOSUB 112:PRINT:GOTO 50:CLS
114	REM GOSUB 113:PRINT:GOTO 50:CLS
115	REM GOSUB 114:PRINT:GOTO 50:CLS
116	REM GOSUB 115:PRINT:GOTO 50:CLS
117	REM GOSUB 116:PRINT:GOTO 50:CLS
118	REM GOSUB 117:PRINT:GOTO 50:CLS
119	REM GOSUB 118:PRINT:GOTO 50:CLS
120	REM GOSUB 119:PRINT:GOTO 50:CLS
121	REM GOSUB 120:PRINT:GOTO 50:CLS
122	REM GOSUB 121:PRINT:GOTO 50:CLS
123	REM GOSUB 122:PRINT:GOTO 50:CLS
124	REM GOSUB 123:PRINT:GOTO 50:CLS
125	REM GOSUB 124:PRINT:GOTO 50:CLS
126	REM GOSUB 125:PRINT:GOTO 50:CLS
127	REM GOSUB 126:PRINT:GOTO 50:CLS
128	REM GOSUB 127:PRINT:GOTO 50:CLS
129	REM GOSUB 128:PRINT:GOTO 50:CLS
130	REM GOSUB 129:PRINT:GOTO 50:CLS

Continued on page 18

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OPEN FORUM

Continued from page 15

```

7 LET CLS=16624
5 LET CLSCHAR=16635
10 SLOW
20 GOSUB 1000
30 FOR A=1 TO 22
40 RAND USR UP
50 NEXT A
60 GOSUB 1000
70 FOR A=1 TO 22
80 RAND USR DOWN
90 NEXT A
100 GOSUB 1000
110 FOR A=1 TO 32
120 RAND USR RIGHT
130 NEXT A
140 GOSUB 1000
150 FOR A=1 TO 32
160 RAND USR LEFT
170 NEXT A
180 FOR A=0 TO 63
190 POKE CLSCHAR,A
200 RAND USR CLS
210 NEXT A
220 FOR A=128 TO 191
230 POKE CLSCHAR,A
240 RAND USR CLS
250 NEXT A
260 POKE CLSCHAR,0
270 RAND USR CLS
280 PRINT AT 11,12;"FINISHED"
290 STOP
1000 POKE CLSCHAR,126
1010 RAND USR CLS
1020 PRINT AT 0,0;"TL"
1030 PRINT AT 0,30;"TR"
1040 PRINT AT 21,0;"BL"
1050 PRINT AT 21,30;"BR"
1060 RETURN

```

ASSEMBLER LISTING

```

2 REM GOSUB 7ERNDRSTR:55:##
VAL GOSUB GET LPRINT #478 ('CLS
/77 CHR$ ERAND FAST #778 LPRN
NT FAST GOSUB #4 LPRINT 70 71
CLS / ERAND)STRS #77FUAL #3
GOSUB B: #FPAT ( PAUSE ,L#-EE
RND777UAL #3 GOSUB #5, #77AT
PAUSE #ERAND # CHR$ #54 #EXT
#4 LIST ERAND75:RNDSTRAND50:7A
N
3 REM
5 REM SCREEN SCROLLS READY
FOR ASSEMBLING BY BUG-BYTES ZXAS
10 REM
15 REM #
20 REM #
30 REM LD DE. (16396)

```

```

35 REM PUSH DE
40 REM LD HL,33
50 REM ADD HL,DE
60 REM LD BC,693
65 REM PUSH BC
70 REM LD B,22
80 REM POP BC
90 REM POP HL
100 REM ADD HL,BC
110 REM LD B,32
120 REM LD INC HL
130 REM POP HL,0
140 REM DJNZ,L0
150 REM JR L6
160 REM #
170 REM LD BC,726
180 REM LD HL. (16396)
190 REM #
200 REM ADD HL,BC
210 REM LD D,H
220 REM PUSH HL
230 REM LD BC,693
240 REM POP HL
250 REM ADD HL,BC
260 REM LDDR
270 REM LD B,32
280 REM POP HL
290 REM INC HL (HL),0
300 REM LD HL,0
310 REM INC HL
320 REM DJNZ,L1
330 REM #
340 REM #
350 REM XOR A
360 REM LD B,22
370 REM LD HL. (16396)
380 REM LD DE,735
390 REM CD HL,DE
400 REM LD D,H
410 REM LD E,L
420 REM #
430 REM LDR B,C
440 REM LD B,C,31
450 REM LD (DE),A
460 REM DEC DE
470 REM DEC DE
480 REM DEC HL
490 REM DEC HL
500 REM DJNZ,L2
510 REM POP BC
520 REM DJNZ,L2
530 REM JR L6
540 REM #
550 REM XOR A
560 REM LD B,22
570 REM LD HL. (16396)
580 REM INC HL
590 REM LD D,H
600 REM LD E,L

```

```

610 REM INC HL
620 REM LDR B,C
630 REM LD BC,31
640 REM LDR
650 REM LD (DE),A
660 REM INC DE
670 REM INC DE
680 REM INC HL
690 REM INC HL
700 REM POP BC
710 REM DJNZ,L3
720 REM #
730 REM #
740 REM LD HL. (16396)
750 REM #
760 REM LD BC,726
770 REM LDR A. (HL)
780 REM CP 115
810 REM JR Z,L4
820 REM LD HL,1,0
830 REM LD INC HL
840 REM DEC BC
850 REM XOR A
860 REM CP C
870 REM JR NZ,L5
880 REM CP B
890 REM JR NZ,L5
900 REM #
910 REM LDR HL. (16396)
920 REM INC HL
930 REM LD (16396),HL
940 REM LD HL,16441
950 REM LD (HL),33
960 REM INC HL
970 REM LD (HL),24
980 REM RET
1000 REM FOR A 16K ZX-81
1010 REM
1020 REM WRITTEN BY K.STREATER
11/7/82
1030 REM
1040 REM #
1050 REM LET ZZZ=16514
1060 REM POKE 32641,INT (ZZZ/256)
1070 REM POKE 32640,ZZZ-256*INT (ZZZ
/256)
1080 REM RAND USR 32655
1090 REM PRINT AT 21,0;"ERROR ",PEEK
3251
9060 SLOW

```

Screen scrolls by K A Streater

Calendar for 1983

on BBC Micro

This program will draw a 1983 calendar.

The variables used are:

DS(J) = Day of the week.

Y\$ = Year for the calendar (1983).

M = Number of days in the month.

MS\$ = Name of the current month+Y\$.

L\$ and LL\$ are ruling lines.

SS\$ = Two spaces.

TS\$ = 20 spaces.

US\$ = Underscore the headings.

L = Length of each heading.

T = End position of a heading.

J = 1st January / loop variable.

D = Days in month / loop variable.

To run the program:

1. Type 'RUN', then adjust position of

paper before switching on the printer to set the TOP OF FORM position. Press 'RETURN'.

2. At the end of a month the printout will stop to allow you to adjust the paper position, or insert a fresh sheet of paper.

3. Press the SPACE BAR to continue printing, to the year's end.

4. Rulings can be changed by duplicating line 350 and inserting the extra L\$ rulings at new line 335 so giving more space for each day's entries. A dummy GET statement after the J = 1 on line 340 will halt printing at the end of each week.

5. January 1st, 1983, is Saturday, the seventh day, hence J = 7 on line 220. For any other year the value for J must be reset and also Y\$ in line 50. On leap

years after February 28 to 29 on line 150.

On the BBC Micro add line 90 VDU 1,27;1,65;1,10 to change the line spacing to 10/72 inch on the Epsom 80 printer and give a 10.5 inches page length for 31 days.

For many machines unpredictable results can be avoided by switching on the printer and entering all the printer instructions in direct mode from the keyboard first. These can be checked with a dummy run before the Basic program is loaded.

The 'string-forming' routine, on lines 260 to 300, is compatible with all Basics and will be found useful as a subroutine in other programs besides this one. MS\$ is left padded with spaces to ensure good centring whereas the dates are left-justified to a standard format in line 330. A double line is ruled at the end of each week in line 340.

```

10 REM -----
20 REM CALENDAR FOR 1983
30 REM -----
40 DIMD$(7)
50 S$="":Y$="1983"
60 T$="":
70 L$="":
80 LL$="-----"
90 :
100 DATASUNDAY, MONDAY, TUESDAY, WEDNESDAY
110 DATATHURSDAY, FRIDAY, SATURDAY
120 REM -----
130 REM SET FEBRUARY, 29 ON LEAP YRS.
140 REM -----
150 DATAJANUARY, 31, FEBRUARY, 28
160 DATAMARCH, 31, APRIL, 30, MAY, 31
170 DATAJUNE, 30, JULY, 31, AUGUST, 31
180 DATASEPTEMBER, 30, OCTOBER, 31
190 DATANOVEMBER, 30, DECEMBER, 31
200 FORJ=1TO7:READD$(J):NEXT
210 REM -----
220 J=7: REM Saturday = 1st January
230 REM ALTER J TO SUIT ANOTHER YEAR

```

```

240 REM -----
250 FORK=1TO12:READM$,M
260 M$=M$+Y$:U$=""
270 L=LEN(M$):T=L/L+20
280 FORI=1TOL:U$=U$+"":NEXT
290 PRINTRIGHT$(T$+M$,T)
300 PRINTRIGHT$(T$+U$,T)
310 PRINT
320 FORD=1TOM
330 PRINTRIGHT$(S$+STR$(D),3):S$:D$(J)
340 IFJ=7 THEN PRINTLL$:J=1:GOTO 370
350 PRINTL$
360 J=J+1
370 NEXT D
380 X=GET: REM DUMMY INPUT PAUSE
390 NEXT K
400 END

```

Calendar for 1983 by L Hurst

Trace

on Vic20

This program is an analogue display for Vic20 with 3K Super Expander, which uses a twin moving trace resembling that used in electrocardiographs, oscilloscopes, etc. The various parameters can be quickly altered to suit any particular

application. I reckon this program could be of immense value to hobbyists and experimenters for monitoring and displaying various inputs from external equipment.

The inputs are made through the control port of the Vic using the two paddle inputs. The program as I've supplied it runs as fast as possible (fastest trace scan) but should the user need a more rapid trace, he can dispense with the Vertical numerical col-

umn or alternatively, increase the increments in lines 50, 52 and 55.

The "unaffected" position of the two traces can be changed by altering the plussed-on values in lines 28 and 30. The traces automatically renew after each scan using line 56. Sound could be added to give a signal if the traces or just one trace, perhaps, reaches a certain position, to sound an alarm.

```

1 REM TWIN-TRACE DISPLAY
2 REM R.BARTON.
3 A=50
4 GRAPHIC2
5 COLOR0,3,1,1
10 CHAR0,0,"9":CHAR1,0,"8":CHAR2,0,"7":CHAR3,0,"6":CHAR4,0,"5"
11 CHAR5,0,"4":CHAR6,0,"3":CHAR7,0,"2":CHAR8,0,"1":CHAR9,0,"0"
12 CHAR10,0,"9":CHAR11,0,"8":CHAR12,0,"7":CHAR13,0,"6":CHAR14,0,"5"
13 CHAR15,0,"4":CHAR16,0,"3":CHAR17,0,"2":CHAR18,0,"1":CHAR19,0,"0"
28 Y1=PEEK(36872)+35
30 Y2=PEEK(36873)+560
50 DRAW2,A,Y1TOA+30,Y1
52 DRAW2,A,Y2TOA+30,Y2
55 A=A+30
56 IFA>=1020THEN:SCNCLR:A=50
100 GOTO10
    
```

Trace
by Richard Barton

Screen store

on Spectrum

This program is based on a very short machine code routine, stored above Ramtop, which will load one of up to five screens stored in memory immediately into the screen memory area. It needs only a small Basic program to display these screens instantly. The Spectrum can produce high resolution pictures, but it takes a long time. This program will not speed up that process, but at least they can be called up fairly rapidly.

A screen of data on the Spectrum is 6912 bytes long, so starting at the top of memory, and subtracting, we end up with the following addresses: 58624, 51712, 44800, 37888, 30976. The machine code is 12 bytes long giving us address 30964. So to reserve the space in memory we CLEAR 30963.

I used "prog 1" to load the machine code and if all has gone well on running it,

the result shown should be printed. The machine code is based on the LDIR instruction which will perform a transfer of a block of memory from one place to another. BC is loaded with the length of the block, HL with the address the block starts at and DE with the destination address. So BC is loaded with 6912, HL with 58624 — the first address of our screens and DE is loaded with 16384 the starting address of the display file. A RANDOMISE USR 30964 will now call up this machine code.

When this space has been reserved and the code entered it is possible to load up to five different high resolution screens into memory. This is done by using a pre-recorded screen and using the direct command LOAD " " CODE 'address'. Where 'address' can be one of the five mentioned previously. To move a different screen to the one at location 58624 we must change the value of HL. So different values must be poked directly to addresses 30968 and 30969. Fortunately the length of the Spectrum's display file is an

exact multiple of 256 so we can leave address 30968 at '0' and poke 30969 with the required value. These are: 229, 202, 175, 148, 121.

The driver program will (from line 2) display a different screen every few seconds, depending on the Pause value in line 5. Once all five screens have been entered above Ramtop they can be stored on tape by SAVE "name" CODE 30964,34572. What I did was to save "SL" line 1, the driver program, just before all the code so that it would load and run the code automatically.

It is possible to lower Ramtop even further and get another screen in but this leaves only enough room for about three lines of Basic! Alternatively Ramtop could be raised to store the minimum required number of screens. This program allows a high resolution screen to be instantly available in an ordinary Basic program and so it does not have to be loaded in separately at the beginning directly on to the screen.

1 REM

SCREEN LOADER

Five screens may be loaded, at locations: 58624 : 51712 : 44800 : 37888 : 30976 using the command "LOAD " " CODE (location)".

```

10 CLEAR 30963
20 FOR n=30964 TO 30975: READ
30 POKE n,a
30 PRINT n;" " :PEEK n: NEXT n
40 DATA 1,0,27
50 DATA 33,0,229
50 DATA 17,0,64
70 DATA 237,176
80 DATA 201
    
```

```

30964 1
30965 0
30966 27
30967 33
30968 0
30969 229
30970 17
30971 0
30972 64
30973 237
30974 176
30975 201
    
```

```

30974 176
30975 201
30964 LD BC,6912
30967 LD HL,58624
30970 LD DE,16384
30973 LDIR
30975 RET
30964 LD BC,6912
30975 RET
30976 NOP
30977 NOP
    
```

```

30967 LD HL,58624
30970 LD DE,16384
30973 LDIR
0:REM
    
```

```

0:REM
1 BORDER 0: PAPER 0: INK 7: C
LEAR 30963: PRINT " : LOADING LE
AVE TAPE RUNNING " : LOAD " " COD
E
2 DATA 175,202,229,202,175,14
8,121,148,1
3 READ a: IF a=1 THEN RESTORE
GO TO 3
4 POKE 30969,a: RANDOMISE USR
30964
5 PAUSE 5: GO TO 3
    
```

Screen store
by Keith Robertson

Polar plotting

on BBC Micro

This program is written in Basic for a BBC Microcomputer with 32K of Ram. It uses Mode 2 to produce a series of shapes with the high-resolution graphics. The computer will draw screens of circles, ellipses, spirals, and flowers.

Between each screen there is a brief pause, the screen will then clear and the next set of shapes will be drawn. Pressing *Escape* at any point will end the program, otherwise it will loop continuously.

Program notes:

50 to 80 Initialise — Calls PROCIntro, which prints

a brief introduction, ON ERROR set by line 790, the cursor is turned off by line 70 and a graphics window is defined in line 80.

100 to 580 Main loop — Draws screenful of each of the shapes, each one being separated by a delay of several seconds. PROCplot is called to do all the drawing.

600 to 770 PROCplot — This procedure controls all of the plotting used to draw the various shapes. Eight parameters are passed from the main loop to this procedure. The first is the polar equation of the shape to be plotted. The other parameters control the size of the shape, its position on the screen and whether it is to be filled in or not. Lines 640 to 690 is the loop that converts each polar co-ordinate supplied from the equation into ordinary X-Y co-ordinates. Lines

710 to 760 fill in the shape if required, i.e.: if FL1% is passed as true, PROCIntro — initialise.
780 to 930 PROCwait — Provides delay of required number of seconds.

The technique used to draw all the shapes is that of polar plotting, which allows points to be represented by a distance and an angle rather than two distances. All this does is allow complex shapes to be represented by simple equations, i.e.: the equation of a spiral is $r = \theta \cdot a$.

The program is quite slow, since it is written in Basic, however, it does produce some nice effects. With Rem statements removed it occupies under 2K.

```

10 REM Polar Plotting Demonstration
20 REM Written for the BBC MICRO
30 REM Model B by M.J. Dunn
40 REM Initialise
50 MODE 7:PROCIntro
60 MODE 2
65 REM Turn off cursor
70 VDU 23;11;0;0;0;0
75 REM Define graphics window
80 VDU 24;0;0;1279;975;
90 REM Main Loop
100 REPEAT
110 COLOUR 1:PRINT TAB(6);"CIRCLES"
120 FOR N%=1 TO 8
130 GCOL 1,RND(7)
140 PROCplot("2",RND(1279),RND(1023),RND
(100)+40,1,2,TRUE,FALSE)
150 NEXT
160 PROCwait(3)
170 CLG
180 FOR N%=1 TO 8
190 GCOL 1,RND(7)
200 PROCplot("2",RND(1279),RND(1023),RND
(100)+40,1,2,FALSE,TRUE)
210 NEXT
220 PROCwait(3)
230 CLS
240 COLOUR 2:PRINT TAB(6);"ELLIPSES"
250 FOR N%=1 TO 8
260 GCOL 1,RND(7)
270 PROCplot("3/(2+COS(theta))",RND(1279),
RND(1023),RND(100)+40,1,2,TRUE,FALSE)
280 NEXT
290 PROCwait(3)
300 CLG
310 FOR N%=1 TO 8
320 GCOL 1,RND(7)
330 PROCplot("3/(2+COS(theta))",RND(1279),
RND(1023),RND(100)+40,1,2,FALSE,TRUE)
340 NEXT
350 PROCwait(3)
360 CLS
370 COLOUR 3:PRINT TAB(6);"SPIRALS"
380 FOR N%=1 TO 7
390 GCOL 0,N%
400 PROCplot("theta",640,512,10,N%,4,FALSE,
FALSE)
410 NEXT
420 PROCwait(3)
430 CLG
440 FOR N%=1 TO 7
450 GCOL 0,N%
460 PROCplot("theta",640,512,10,N%,4,FALSE,
TRUE)
470 NEXT
480 PROCwait(3)
490 CLS
500 COLOUR 4:PRINT TAB(6);"FLOWERS"
510 FOR N%=1 TO 8
520 GCOL 0,RND(7)
530 A%=RND(16)+4
540 PROCplot("1+COS(theta*A%)",RND(1279),
RND(1023),100,1,2,FALSE,FALSE)
550 NEXT
560 PROCwait(3)
570 CLS
580 UNTIL FALSE
590 END
600 REM Procedure to Plot shapes

610 DEFPROCplot(eqn%,X%,Y%,SF,S,N%,FL%,FL2%)
620 LOCAL theta,r,x,y,x1%,y1%
630 IF FL2% THEN x1%=RND(200)-100;y1%=RND(200)-100
640 FOR theta=0 TO N%*PI STEP .063
650 r=(EVAL(eqn%)*S)
660 x=r*COS(theta)*SF+X%;y=r*SIN(theta)*SF+Y%
670 IF theta=0 THEN MOVE x,y ELSE DRAW x,y
680 IF FL2% THEN PLOT 1,x1%,y1%;MOVE x,y
690 NEXT
700 IF NOT FL% THEN ENDPROC
705 REM Fill Shape
710 MOVE X%,Y%
720 FOR theta=0 TO N%*PI STEP .063
730 r=(EVAL(eqn%)*S)
740 MOVE r*COS(theta)*SF+X%,r*SIN(theta)*SF+Y%
PLOT 85,r*COS(theta+.063)*SF+
X%,r*SIN(theta+.063)*SF+Y%
750 MOVE X%,Y%
760 NEXT
770 ENDPROC
780 DEFPROCIntro
790 ON ERROR MODE 7:END
800 VDU 23;11;0;0;0;0
810 V=RND(-TIME)
820 PRINT TAB(6,6);CHR$(141)CHR$(131);"GRAPHICS
DEMONSTRATION";TAB(6,7);CHR$(1
41)CHR$(131);"GRAPHICS DEMONSTRATION"
830 PRINT
840 PRINT " This program draws on the screen a
series of geometrical figures, such as
circles, ellipses, spirals etc."
850 PRINT
860 PRINT "After each screen there will be a
short pause, the screen will clear
and the next section will be drawn."
870 PRINT
880 PRINT "Press";CHR$(129);"ESCAPE";CHR$(135);
"to halt the program."
890 PRINT
900 PRINTTAB(6);CHR$(134);"Press any key to
start"
910 *FX 15.1
920 A=GET
930 ENDPROC
935 REM Delay Procedure
940 DEFPROCwait(S):LOCAL T:T=TIME:REPEAT UNTIL
TIME-T+S*100:ENDPROC

```

Polar plotting by M Dunn

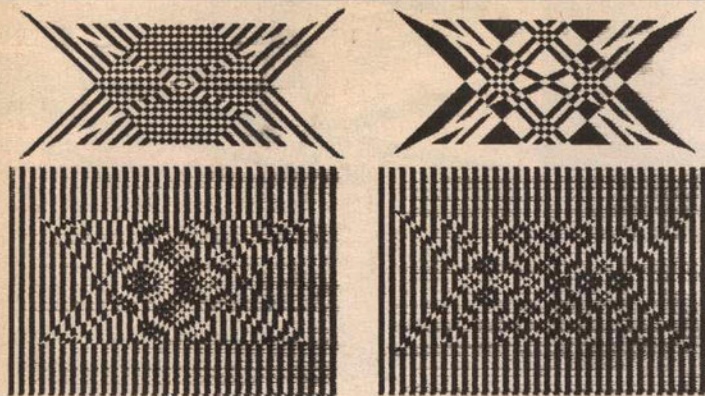
Hypnotist

on Spectrum

This compact program gives an infinite array of changing patterns.

As you can see from the examples the pattern is generated on plain and vertically-striped backgrounds, thus giving differing effects. Sound is produced at the end of each drawing sequence.

To copy on to the printer, press *Break-Copy* and when printed *Continue*. The pattern will then commence from the last drawing sequence. Try alternative patterns by adjusting line 40.



Bird and caterpillar

on Vic20

A hungry caterpillar is crawling over your screen. The caterpillar spots a nice piece of lettuce and it is up to you to see that it gets the lettuce. You have full control over the direction in which the caterpillar moves. The direction can be changed by pressing one of four keys as follows: Z for LEFT, X for RIGHT,

/ for UP,
for DOWN.

Danger lurks. The caterpillar must not hit the wall (the edge of the screen display), otherwise it gets squashed. Also the caterpillar mustn't suddenly go backwards, otherwise it bites itself and the game ends. Thus, for example, if the caterpillar is going down don't press / for up, press Z or X first. As soon as a piece of food is eaten another piece appears.

There is more danger around. A bird is

```

10 REM BY HYPNOTIST
20 BORDER 0: GO SUB 1300
30 LET a=175: LET c=94: OVER 1
40 LET b=INT (RND*38)
50 FOR b=1 TO 68: LET d=40
60 PLOT d+b,d: DRAW b,b
70 PLOT d+b-b,d: DRAW -b,-b
80 PLOT d+b,d+c: DRAW b,-b
90 PLOT d+b-b,d+c: DRAW -b,-b
100 NEXT b: BEEP .1,b-40
110 GO TO 30
120 PAPER 0: CLS :INK 1+b*8/RND
130 IF RND>.5 THEN RETURN
140 FOR a=0 TO 87
150 PRINT "B*CHR$ 133";
160 NEXT a
170 RETURN
    
```

Hypnotist

by Paul Reynolds

flying around the screen, it may eat the caterpillar or the food. The bird usually heads straight towards the food and hovers around the food, waiting for you. If you are fast you'll be able to make the caterpillar eat the food and escape from the bird. You'll do well if the caterpillar eats more than ten bits of food.

The program will run on any Vic20, expanded or not, lines 11 and 12 take care of the necessary changes. The many REM statements explain the program.

```

1 REM %%%%%%%%%%%%%%%%%%%%%%%%%%
2 REM %
3 REM % BIRD AND CATERPILLAR %
4 REM %
5 REM % BY CZES KOSNIOWSKI %
6 REM %
7 REM %%%%%%%%%%%%%%%%%%%%%%%%%%
8 REM
9 REM
10 REM %%%%%%%%%% INITIAL SETTINGS %%%%%%%%%%
11 PP=7680+(PEEK(44)*18)*3294
12 QQ=36480+(PEEK(44)*18)*5124
13 VO=36878:SO=VO-1
14 POKE VO+1,26
20 REM %%%%%%%%%% CONTROLS %%%%%%%%%%
21 PRINT CHR$(147)
22 PRINT " BIRD AND CATERPILLAR "
23 PRINT "CONTROLS":PRINT
24 PRINT "Z LEFT / DOWN"
25 PRINT "X RIGHT . DOWN"
26 PRINT "PRESS ANY KEY TO GO"
27 GET OF:IF OF="" THEN 27
30 REM %%%%%%%%%% SETTINGS FOR EACH NEW GAME
31 REM %%%%%%%%%% CATERPILLAR %%%%%%%%%%
32 A(0)=PP+238
33 A(1)=A(0)-1
34 A(2)=A(1)-1
35 V=1:V=0
36 SR=0
40 REM %%%%%%%%%% BIRD %%%%%%%%%%
41 B=PP+18
42 U=0:V=1
50 REM %%%%%%%%%% SCREEN %%%%%%%%%%
51 PRINT CHR$(147)
52 FOR J=0 TO 22
53 POKE QQ+22*J,2
54 POKE PP+22*J,160
55 POKE QQ+22*J+21,2
56 POKE PP+22*J+21,160
57 FOR I=1 TO 20
58 POKE QQ+1+22*J,5
59 NEXT I
60 REM %%%%%%%%%% FOOD %%%%%%%%%%
61 K=PP+463+INT(RND(1)*20)
62 POKE K,88
63 M=INT((K-PP)/22)
64 N=K-PP-22*M
70 REM %%%%%%%%%% START %%%%%%%%%%
    
```

```

71 REM %%%%%%%%%% CATERPILLAR CONTROLS %%%%%%%%%%
72 GET #
73 IF #="Z" THEN X=-1:V=0
74 IF #="X" THEN X=1:V=0
75 IF #="." THEN X=0:V=-1
76 IF #="/" THEN X=0:V=1
80 REM %%%%%%%%%% HAS CATERPILLAR HIT WALL? %
81 M=(0)+X+22*V-PP+1
82 IF M>386 OR M<1 THEN Z=1:GOTO 170
83 M=M-22*INT(M/22)
84 IF M=1 OR M=0 THEN Z=1:GOTO 170
90 REM %%%%%%%%%% HAS CATERPILLAR BIT ITSELF?
91 IF A(0)=A(2) THEN Z=2:GOTO 170
100 REM %%%%%%%%%% THE CATERPILLAR %%%%%%%%%%
101 POKE A(2),32
102 A(2)=A(1):A(1)=A(0)
103 A(0)=A(0)+X+22*V
104 POKE A(0),160
110 REM %%%%%%%%%% HAS CATERPILLAR EATEN FOOD?
111 IF A(0)=K THEN SR=SR+1:GOSUB 200
120 REM %%%%%%%%%% RANDOM CHANGE OF BIRD'S DIRECTION
121 IF M=INT(D/22) THEN V=V*V:GOTO 124
122 IF M=INT(D/22) THEN U=1:V=0
123 V=-V*V
124 IF M=0 THEN U=U*U:GOTO 129
125 IF M=0 THEN U=0:V=1
126 U=-U*U
127 IF M=INT(D/22) THEN V=V*V:GOTO 129
128 V=-V*V
129 ON INT(RND(1)*9):GOSUB 220
130 REM %%%%%%%%%% MAKING SURE BIRD DOES NOT CRASH
131 D=B+U+22*V-PP+1
132 D=D-22*INT(D/22)
133 IF D>386 OR D<1 OR D/2 OR D/21 THEN U=U*V=V
140 REM %%%%%%%%%% THE BIRD %%%%%%%%%%
141 POKE B,32
142 B=B+U+22*V
143 POKE B,65
150 REM %%%%%%%%%% HAS BIRD EATEN CATERPILLAR
151 FOR I=0 TO 2
152 IF B=A(1) THEN Z=3:GOTO 170
153 NEXT I
160 REM %%%%%%%%%% HAS BIRD EATEN FOOD %%%%%%%%%%
151 IF B=K THEN GOSUB 200
167 GOTO 72
170 REM %%%%%%%%%% CATERPILLAR DEAD %%%%%%%%%%
171 POKE SO,223
172 FOR I=1 TO 0 STEP -2
    
```

```

173 POKE VO,1
174 FOR J=1 TO 100:NEXT
175 NEXT
176 POKE SO,0
177 POKE VO,0
178 PRINT CHR$(147)
179 PRINT " BIRD AND CATERPILLAR "
180 PRINT " THE CATERPILLAR ATE " :SR;
181 IF SR=1 THEN PRINT "BIT OF FOOD":GOTO 183
182 PRINT "BITS OF FOOD"
183 PRINT
184 IF Z=1 THEN PRINT " CATERPILLAR SQUASHED "
185 IF Z=2 THEN PRINT "CATERPILLAR BIT ITSELF "
186 IF Z=3 THEN PRINT " BIRD ATE CATERPILLAR "
187 FOR I=1 TO 1000:NEXT
188 POKE 195,0
189 PRINT PRINT " ANOTHER GO? Y OR N "
190 GET OF:IF OF="" THEN 190
191 IF OF="Y" THEN 30
192 END
200 REM %%%%%%%%%% FOOD HAS BEEN EATEN %%%%%%%%%%
201 REM %%%%%%%%%% FOOD NOISE %%%%%%%%%%
202 FOR I=1 TO 0 STEP -1
203 POKE SO,225+I
204 POKE VO,1
205 FOR J=1 TO 10:NEXT
206 NEXT
207 POKE SO,0
208 POKE VO,0
210 REM %%%%%%%%%% NEW FOOD %%%%%%%%%%
211 M=INT(RND(1)*23)
212 N=INT(RND(1)*20)+1
213 K=M+22*N+PP
214 IF K=0 THEN 211
215 FOR I=0 TO 2
216 IF A(I)=K THEN 211
217 NEXT I
218 POKE K,88
219 RETURN
220 U=V:V=U:U=V:RETURN
    
```

Bird and caterpillar

by Czes Kosniowski



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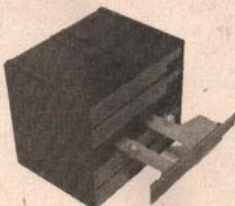
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Storing data above ramtop

Kevin Griffiths explains how to transfer data between programs on the 16K ZX81.

The programs in this article show how to Load separate data files from cassette into the ZX81 while a program is already in the machine, by storing data above ramtop. All the programs require a 16K Ram pack.

On many occasions it may be beneficial to transfer data used in one program to another, so that it may be handled in a different format. Let us take an example. Suppose you were selling software and you wanted to store customers' records on computer, eg create a datafile, produce labels to stick on the packages, produce a cheque schedule for the bank and update your computer-stored accounts. If you received say, 50 orders on a given day, then you would need to type in name, address, cheque number and amount of each order into four separate programs. A far less time consuming and daunting task would be to type the information in once and pass it into each program.

Here are one program and two routines to enable you to do just that. The two routines are included within two example programs.

Program 1 will be repeated each time you use the technique. It would be advisable therefore to type in this program and Save it on to tape before following the example.

We are going to use a simple telephone directory, which will contain just five records as a demonstration. The directory will use the following arrays A\$(5,10), B\$(5,50), C(5) and the string Z\$. These have been used to show that any type of data may be passed.

First, enter program 1. Then add the following lines to the beginning of the program.

```
10 DIM A$(5,10)
20 DIM B$(5,50)
30 DIM C(5)
40 LET Z$ = "(6 spaces) TELEPHONE DIRECTORY
(7 spaces)"
```

Any arrays which you *Dimension* must always be at the beginning of the program for this technique to work (if you wanted machine code routines you would need to store them in an array instead of a Rem line).

After entering the above lines, type Run followed by *Newline*. The number of bytes that will need to be made available to hold your data above ramtop should appear on the screen. If you are satisfied with your arrays, do as the computer asks and type Y followed by *Newline*, if not type N and correct your arrays. After typing Y the computer will automatically *New* the program and the K cursor will appear in the bottom left-hand corner. Now enter program 2.

The beginning of the second program already contains our *Dimensioned* arrays. This program would normally be your data entry type program. If you Run the program the computer will ask for name, address and telephone number five times. As it does so, you should invent some data and enter it. On completion, the computer will go into *Fast* mode and store a copy of your data above ramtop. Having done so, it will ask you to *New* and enter the next program. Lines 200 to 290 are the lines you would need to add to your data entry program.

The next program will recall the data and handle it as necessary, eg print labels. In our example, this program is merely going to print the data that we have entered. However, before you enter program 3, type in as a direct command:

```
PRINT Z$
OR
PRINT A$(2)
```

On both occasions the computer will return a report code of 2/0, proving that it cannot find the data. Now enter program 3 and simply type Run followed by *Newline*.

Again the computer will go into *Fast* mode and, after a few seconds, will return to *SLOW* mode and print the data on the screen.

The routine for recovering the data is between lines 60 and 120 and must be entered in any program which needs to access the data. Note the word *access*, as this is all the program does. It copies the data from above ramtop, it does not destroy it so all you need to do is keep *Loading* programs with the above routine to keep using the same data.

The most important point to remember is that you must *Dimension* your arrays at the beginning of each program and in the same order. Programs 1 and 2 *Dimensioned* Zs using a *Let* statement. Zs was 32 characters long and contained the title. Program 3, however, just defined Zs as an empty string 32 characters long. This is necessary for the computer to have an area to put the title in when recalling data from above ramtop.

The program and routines are simple to use and a little bit of thought by the user about program ideas and design can open up endless possibilities.

PROGRAM 1.

```
200 LET A=PEEK 16400+256*PEEK 1
6401 LET B=PEEK 16404+256*PEEK 1
6405 LET C=B-A
6410 PRINT "YOUR DATA WILL REQUI
;C-7
6420 PRINT "BYTES ABOVE RAMTOP."
6445 PRINT
6450 PRINT "IF YOU WISH RAMTOP T
O BE SET
6460 PRINT "TO ACCODODATE YOUR A
RRAYS THEN"
6470 PRINT "PLEASE TYPE ""Y"", T
HEN LOAD"
6480 PRINT "NEXT PROGRAM."
6490 PRINT
6500 PRINT "IF YOU WISH TO CHANG
E THE ARRAYS"
6510 PRINT "IN ANY WAY PLEASE TY
PE ""N""."
6520 PRINT "AND AHEND."
6530 INPUT Z$
6535 IF Z$(0)="Y" THEN CLS
6540 IF Z$(0)="Y" THEN LIST
6550 LET X=C-7
6560 POKE 16388,INT (128-(X/256))
6570 PRINT
6575 POKE 16388,(256*(128-PEEK 1
6389))-X
6580 NEW
```

PROGRAM 2.

```
10 DIM A$(5,10)
20 DIM B$(5,50)
30 DIM C(5)
40 LET Z$ = "(6 spaces) TELEPHONE DIR
(7 spaces)"
ECTORY
50 FOR I=1 TO 5
60 CLS
60 PRINT "NAME ";I
70 INPUT A$(I)
80 PRINT
85 PRINT A$(I)
90 PRINT "ADDRESS"
100 INPUT B$(I)
110 PRINT B$(I)
120 PRINT
130 PRINT "TEL. NO."
140 INPUT C(I)
150 PRINT C(I)
170 NEXT I
180 CLS
200 REM THE SECTION FOLLOWING
TRANSFERS THE DATA
ABOVE RAMTOP.
205 FAST
210 LET A=32768-(PEEK 16388+256
*PEEK 16389)
220 LET B=PEEK 16400+256*PEEK 1
6401 FOR X=0 TO (A-1)
6420 POKE (32768-A)+X,PEEK (B+X)
6430 NEXT X
6440 SLOW
6450 PRINT "DATA HAS BEEN STORED"
220 PRINT "PLEASE ""NEW"" AND L
OAD NEXT"
290 PRINT "PROGRAM."
```

PROGRAM 3.

```
10 DIM A$(5,10)
20 DIM B$(5,50)
30 DIM C(5)
40 LET Z$ = ""
50 REM THIS SECTION RECALLS
THE DATA TO BE USED
IN THE REST OF THE
PROGRAM
60 FAST
70 LET A=32768-(PEEK 16388+256
*PEEK 16389)
80 LET B=PEEK 16400+256*PEEK 1
6401 FOR X=0 TO (A-1)
100 POKE B+X,PEEK (32768-A+X)
110 NEXT X
120 SLOW
125 REM EXAMPLE PROGRAM
130 CLS
140 FOR I=1 TO 5
150 PRINT Z$
170 PRINT A$(I)
180 PRINT B$(I)
190 PRINT C(I)
200 PRINT B$(I)
210 PRINT
220 PRINT "TEL. NO. ";C(I)
2230 FOR P=1 TO 25
240 NEXT P
250 CLS
260 NEXT I
```


At your command

David Nowotnik explains how you can Peek and Poke to the Spectrum display file.

Because of the complex layout of the Spectrum display file, the handbook suggests that you are unlikely to want to use Peek or Poke to this area of Ram. However, for high resolution interactive games or animation effects, you probably will want to use these commands. The problem lies in the calculation of addresses in the display file from row and column data.

To demonstrate the order in which the display file is arranged, try this one-line program. It can be entered as a direct command:

```
FOR i = 16384 to 22527: POKE i, BIN 11111111 :
NEXT i
```

The Bin number causes all pixels to be Ink. A mixture of 0s and 1s will produce a striped pattern. You should notice several things from this routine:

1. The display file is divided into three groups of eight character rows each.
2. Each character square is made up of eight rows of pixels.
3. Each character square is also eight pixels across, this eight pixel row forms one byte in the display file.
4. In each group of eight rows, the top pixel row of all character squares is filled in first, then the second row, and so on.

To be able to calculate addresses, this pattern has to be expressed mathematically. One method of doing this is to turn to binary arithmetic. Expressing display file addresses as a 16-bit binary number, I found that certain groups of bits controlled certain aspects of the screen position corresponding to that address. This is demonstrated in figure 1.

Fig 1. Groups of binary bits within the screen address

```
0 1 0 0 0 0 0 0 0 0 0 0 0 0 0 0
 1   2   3   4   5
```

Group

- 1— Bit 14 is set to indicate values above 16383.
- 2— These two bits hold values 0, 1, or 2; they indicate which group of eight rows.
- 3— Pixel row number within a character (0-7).
- 4— Character row number within a group (0-7).
- 5— Column number (0-31).

From this relationship, I obtained the following expression for calculating screen addresses:

$$\text{Address} = 16384 + 32 * (y \text{ AND } 192) + 256 * (y \text{ AND } 7) + 4 * (y \text{ AND } 56) + x$$

Where y is the pixel row number (0-191) and x is the byte column number (0-31). Position 0,0 is at the top left of the screen.

Unfortunately, the Spectrum does not carry out conventional *And* or *Or* operations (unlike the ZX80 and ZX81), so, this routine will not work using the Spectrum

And. To overcome this problem, I turned to three simple machine code routines to perform *And* in the demonstration program in figure 2.

Written for the 16K Spectrum, the *Read/ Data* lines (100-140) *Poke* the machine code into the UDG area. Lines 140-180 set columns in the attribute file to random Ink colours, whilst lines 200-230 draw a random high-resolution bar chart. The length of the bars grows one pixel row at a time as

you watch the display. The subroutine in lines 20-30 *Pokes* the y value into the three machine code routines; line 30 calculates the addresses according to the aforementioned formula. All the machine code does is:

```
LD B,0
LD A,y
AND 7
LD C,A
RET
```

similarly for *And* 56 and *And* 192. ■

fig 2. Barcharts

```
10 GOTO 100
20 POKE 32747,y: POKE 32755,y:
   POKE 32763,y
30 LET a=16384+32*USR 32760+
   256*USR 32744+4*USR 32752+x
40 RETURN
100 FOR i=32744 TO 32767
110 READ a: POKE i,a
120 NEXT i
130 DATA 6,0,62,0,230,7,79,201,
   6,0,62,230,56,79,201,6,0,62,0,
   230,192,79,201
140 FOR i=22528 TO 22559
150 LET a=56+RND*7
160 FOR j=0 TO 767 STEP 32
170 POKE i+j,a
180 NEXT j: NEXT i
200 FOR x=0 TO 31
210 FOR j=190 TO INT(RND*120)
   STEP -1
220 GO SUB 20: POKE a,254
230 NEXT j: NEXT x
```





Plotting data according to scale

G Morton presents a graph plotting routine to represent data on an x, y scale.

I devised this program to enable me to quickly plot the results obtained from electrical experiments.

Lines 10-100 input the experimental results in the form x,y. Lines 110-150 and lines 160-200 determine the peak values of x and y respectively, so as to be able to scale the screen axis correctly. Lines 210-220 determine the scaling factors for the x and y axis.

Lines 240-270 are required because the Dragon cannot print text to the graphics screen. These lines merely tell the operator the values corresponding to the graduations on the axis.

Line 280 gives the operator time to read the previous screen. Please note that the print statements have been laid out correctly to fill the lines without breaking any words, so don't miss the spaces. Line 280 could be changed to a *press "a" to continue* form, but I found the time allowed quite adequate.

Lines 310-340 adjust the data by using the scaling factors. Lines 330-340 change the data to integer form suitable for the *Pset* statements. This produces an error of less than 1/2 percent, quite suitable for experimental data.



Line 350 prints the data to the screen while lines 370-380 plot the x and y axis. Lines 390-440 plot the graduations on the axis.

Line 290 defines the mode as 3. This is not the highest definition, but does allow the simultaneous plotting of several sets of data in different colours.

While I do not think this is the most efficient method of setting out the program, it is quite quick enough for this purpose. If required, an added line at 355 could be used to plot lines between each data point.

For more than 40 points of data, change the dimension statements in line 30.



```

10 CLS1
20 INPUT "HOW MANY POINTS ? MAXIMUM OF 40";L
30 DIM A$(40),B$(40)
40 FOR M=1 TO L
50 CLS
60 PRINT "INPUT X COORDINATE OF POINT ";M
70 INPUT A$(M)
80 PRINT "INPUT Y COORDINATE OF POINT ";M
90 INPUT B$(M)
100 NEXT M
110 B=VAL(A$(1))
120 FOR M=2 TO L
130 IF VAL(A$(M))>B THEN GOTO 140 ELSE GOTO 150
140 B=VAL(A$(M))
150 NEXT M
160 C=VAL(A$(1))
170 FOR M=2 TO L
180 IF VAL(B$(M))>C THEN GOTO 190 ELSE GOTO 200
190 C=VAL(B$(M))
200 NEXT M
210 D=230/B
220 E=170/C
230 CLS
240 PRINT"THE FOLLOWING GRAPH REPRESENTS THE
DATA PREVIOUSLY DEFINED"
250 PRINT"THE PEAK VALUE OF X IS ";B
260 PRINT"THE PEAK VALUE OF Y IS ";C
270 PRINT" HENCE EACH LINE REPRESENTS
1/10TH OF THESE ANSWERS ON THE RESPEC
TIVE SCALES"
280 FOR S=1 TO 8000:NEXTS
290 PMODE 3,1:SCREEN 1,0:PCLS
300 FOR M=1 TO L
310 A$(M)=STR$(D*(VAL(A$(M))))
320 B$(M)=STR$(E*(VAL(B$(M))))
330 X=INT(VAL(A$(M)))
340 Y=INT(VAL(B$(M)))
350 PSET(X+22,170-Y,3)
360 NEXT M
370 LINE(22,170)-(22,0),PSET
380 LINE(22,170)-(252,170),PSET
390 FOR F=1 TO10
400 LINE(230*F/10+22,172)-(230*F/10+22,168),
PSET
410 NEXT F
420 FOR F=1 TO 10
430 LINE(20,170*F/10)-(24,170*F/10),PSET
440 NEXT F
450 GOTO450
    
```


Is there anything about your computer you don't understand, and which everyone else seems to take for granted? Whatever your problem *Peek* it to Ian Beardsmore and every week he will *Poke* back as many answers as he can. The address is *Peek & Poke*, PCW, Hobhouse Court, 19 Whitcomb Street, London WC2 7HF.

COMPLICATIONS IN COLOUR

Julian Bowden of London SE9, writes:

Q I own a ZX81, and read with interest your article about its US counterpart the Timex 1000. Jeff Naylor said that he adapted his for use over here by by-passing the US modulator and attaching the unit from his own ZX81.

This reminded me that I had been given an Atari video games machine for a Christmas present, and of course I could not use it. I contacted Atari who said that a modification would cost £28.75. I am wondering why it cost this much when a US computer can be adapted quite easily to run on British television.

A You miss one important fact. The ZX81 and Timex 1000 are both black and white video output. Your Atari games machine is colour. Therefore, this requires a much more complex conversion from NSTC to PAL. It would include some internal modification. I am sure that Atari could do it as they have all the plans, but it would be a very different matter for anyone else to attempt it.

The other point is that a conversion done by a non-registered dealer would void your guarantee. Unless you go to the opposite extreme and buy an NSTC compatible television, I would suggest that the only practicable way out of this situation is to send the machine to Atari.

YOU WILL NEED SPECIAL INTERFACING

M Ridgeway of Taylor Road, Southcourt, Aylesbury, Bucks, writes:

Q Hopefully, at Christmas I will be getting an Atari 400 computer. I would like to ask some questions. Can the Amber 2400 printer be used with the Atari 400 without special interfacing? Will the track ball for the Atari VCS,

which is available in America, be able to fit the 400, and will it be released over here?

Lastly, as yet you have not published any programs for the Atari. Now that the price has been lowered to £199, I am sure that a lot more people will be buying it. So, will you publish some programs for it in the future?

A The Amber 2400 will need special interfacing for use with either of the Atari machines. A cable will be needed to interface the Amber to one of the joystick ports. You will also need a special routine, which comes on cassette, to add the controls to the computer.

The price of the printer is £80.40, the conversion cable and cassette is £18.34, and postage and packing is £2.95. All these prices are fully inclusive of VAT. You will also receive complete instructions, a spare inking ribbon and a spare roll of paper.

A couple of people have asked about the track ball. At the moment, Atari does not make one, either here or in America. The one in the US is manufactured by an independent company. A track ball is being considered for the new Atari computer based on the 400, but it is not due for release over here until well into 1983. None of the current games software employs the track ball, so you would have to write your own routines.

As for publishing Atari programs, we are more than happy to consider programs for any micro computer. But so far we have had little response from Atari owners. So, how about sending some in?

IS THE FAULT AT THE MAINS

C Steneson of Military Road, Pembroke Dock, Dyfed, writes:

Q I own a Vic20 which I have had for a week. However, after being on for half an hour, it constantly

crashes or resets itself. The power light also flashes on and off. Is this a fault in my Vic or are mains fluctuations causing this.

A I cannot see how mains fluctuations can cause this, unless you are having similar trouble with other domestic appliances in your house. If you are, then you will have to call an electrician quickly.

Far more likely is a fault in your Vic. I have not met this problem before on the Vic, which has a good record for reliability. It would seem that somewhere along the line the power input is being overloaded, or else there is a loose wire. If the power light goes out then obviously you have lost power, which is the reason why the computer resets itself — it has the same effect as turning your machine off.

The only thing that puzzles me slightly is why the computer waits half an hour before going off. Is this time pretty constant, or is it variable? If it is constant then it might be a component at fault, such as a capacitor not discharging properly. If the time varies a great deal, then it is more likely to be a loose wire.

It would be as well to check the external wiring, which in effect means checking the plug, to see that a wire has not come loose. If not, you will have to take your computer back to where you bought it and ask for it to be changed or repaired.

CONTRAST CONTROL CUTS DAZZLE

Norman Peckett of Court Close, High Wycombe, Buckinghamshire, writes:

Q I have had my Spectrum for two and a half weeks. Right from the start it has dazzled me. Should the colours be less bright?

Could you also explain to me how I can ask a question in a program, (eg with a Y/N answer) so that I can redirect the user to the beginning of the program, or the end, using the *Inkey\$* function. By the way, I received my Spectrum after cancelling my order and buying a Dragon for cash.

A It is most likely that the television is not set cor-

rectly, which is the cause of your being dazzled. It should not happen. Try re-setting the contrast slightly.

To use *Inkey\$* all you need is a line like *If Inkey\$ = "Y" Then Goto ...* and *If Not Inkey\$ = "Y" Then Goto ...* You are not restricted to *Goto*, but can use any of the statements that can be put after a *Then*. For example *Print, Gosub, Let* and *Stop*, are all possible.

LOADING AND SAVING NOT ZX81 PROBLEMS

R W Denney of Taunton, Somerset, writes:

Q I would appreciate your advice on my ZX81 with QS 3K expansion. After initial problems with *Loading* and *Saving*, I found that it worked if I took out the Ear jack when *Loading*. However, after about three weeks my programs failed to *Load*. The first to go wrong were those near the memory limit.

I wrote to Sinclair Research and they sent me a printed sheet on this problem. The sheet advised that 'output from the cassette should be 2 to 4½ volts, peak to peak.' This output seems excessive — the output from my hi-fi is only 2½ volts. Although pleased with the ZX81, I am disappointed with the storage facilities. I did think of buying a Spectrum, but not if the programs are going to become difficult to store, and can only be stored for a short while.

A *Loading* and *Saving* remains the largest single problem with the ZX81. You do not actually say if the measures advised by Sinclair have been of any use. You need not worry about the output of 4 volts from the Ear socket. The output is AC and there are capacitors in the circuitry to cut down any overload. Also remember that 4-4½ volts is the peak voltage — much of it is less than that.

The 2½ volts from your hi-fi is probably DC, to which different laws apply.

As I have said on several occasions before, whatever problems you might or might not get with a Spectrum, there is no evidence that *Loading* and *Saving* will be among them.

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16K ZX81, 6 cassettes, two months old, good condition, £100 ono. Tel: Adam, Chesham (0494) 785285.

48K MEMO TECH, Ram pack for ZX81, £25. Mr Sharp 01-732 7493.

ZX81 16K, with tapes, books, £70. Telephone Nuneaton 327203.

ZX81, 16K, with software. Tel: Calne (0249) 812038, Mr L. Delpozo.

ZX81, £35 ono. Three months old, perfect working order, upgrading to BBC. Tel: 061-223 1301 extension 2708 (Mr. Javed).

ZX81, 16K, keyboard, filesixty, £70 ono. Paul Baillie, Battle 2717.

16K ZX81, £100-worth of software plus mags and all leads, £90. (Whitley Bay) 528886.

ZX81, 16K, Sinclair built, £30 of software including Asteroids, 3D Monster Maze, Sourcerers Island, as new, £50. Tel: 0501 40469.

ZX81 + 16K Ram + printer, two months old, hardly used, £87.50. Tel: 01-464 0845.

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ZX81, 1K, hardly used, seven months old, all leads + manuals + a book of 30 programs, many on tape, in very good condition, sell for £35. Tel: 01-464 0692 (weekdays after 6 pm).

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VIC20, 16K Ram pack, £300 of software, value £530, want only £300. Tel: Amit, 01-888 0510, after 6 pm.

VIC20, + cassette unit, with Blitz + AMOK cassette, joystick + intro to Basic, £160 ono; Super Exp. Ram, £24; Vic 20, Graphic Printer complete with 1,000 sheets of paper, 150; Vic20, programme reference guide, £10. Telephone: Chandlers Ford (04215) 67411 (1 pm-2 pm).

VIC20 plus data cassette and dust cover, £140; super expander cartridge, £25; Jelly Monster cartridge, £12; processing reference guide, £8; Dragon Maze game cassette, £5. Tel: 0443 203573 evenings.

VIC20 plus cassette deck, both boxed plus tapes and magazines, £160. Contact Mark on Longfield 6164 evenings and weekends.

THE COUNT, Commodore adventure cartridge, perfect condition, yours for £22 or other CBM adventure in perfect condition. Tel: Leamington Spa (0926) 632901 after 6 pm.

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PET 4032 (Fat 40), 32K + printer, built in sound box, tool kit, picture kit, super chip, many programs including word processor, £650. Tel: Mr. Clines, Bourne End 26576.

PET 2001, 8K, with internal, cassette and screen, with manuals, software, etc., £225. Tel: Gosforth, Cumbria (09405) 332 (evenings).

COMMODORE PET 2001, 32K, complete with cassette deck, all in mint condition, £295 ono. Tel: 01-722 2166.

COMMODORE VIC 20 plus AF Rom mother board and leads, and 3K Ram, £200. Tel: Scott, after 5 pm. Tel: 0462 40405.

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PET 32K, new Rom, large keyboard, cassette, tool kit, microassembler, Basic 4, Eprom programmer, software and many books, £450 ono. Tel: Davco on 01-543 1890 (after 5 pm and weekends).

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ACORN ATOM. 12+12K with disk pack, FP Rom, toolkit and BBC Rom, all books and leads, £400. Tel: Falmouth 314599 (day), 312718 evenings or weekends.

ACORN ATOM, 64K Ram plus 20K Rom, books + software, £220 ono. Tel: 061-747 8822.

ACORN ATOM, 12K Rom, 12K Ram, and power pack, plus basic book, £125 ono. Tel: 01-501 1629 (eves).

ACORN ATOM. 12K Ram, 12K Rom and 4K utility Rom, cassettes, leads, 3 amp power supply and £80 of software. Price £190 ono. Tel: 051-677 7326 evenings.

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ACORN ATOM, 12K + 12K, floating point Rom, leads, power supply, manual + approximately £60 of software including Pacman, Invaders, Galaxians, £130. Tel: Harlow 419 659.

ACORN ATOM, 12K + 12K, floating point Rom plus toolbox PSU plus expansion board giving 5K, with all leads and manual, condition as new, £200 ono. Tel: 0843 582852, after 6 pm.

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Tandys for sale

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VIDEO GENE, 16K, Level II Basic + 9" green screen monitor, micro sort editor/assembler + large selection of books, manuals, cassettes and software, £275 ono. Tel: 021-745 5684.

TRS80, Model 1, Level II, 16K with monitor, cassette recorder, joystick + sound, also manuals, magazines and approximately 100 arcade machine language games, £450. Tel: Worksp 477053.

GENIE 1, 16K, 10 months old plus Green Screen Monitor, 12in EG 101, manuals etc, £350 ono. Tel: Stevenage (0438) 721216 after 5 pm.

TANDY TRS80, Model I, Level II (16K memory), expansion interface unit (additional 16K memory), disc drive (5 1/4" mini disc), disc drive interface cable, Seikosa GP100A printer, printer interface cable, bulk eraser, disc drive, head cleaner, £1,280 ono (all as new). Tel: (0392) 72035.

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TRS80, Model 1 Level II, 2 1/2 years old, 48K expanded interface, high res. character generator, upper/lower case, green screen, cassette rewriter, £350 of software, complete £800 ono. Tel: Long Crendon 208232.

TANDY TRS80, Level II, 16K, screen + cassette recorder, editor assembler, magazines + books, £250 ono. Roscoe, Worcester 352623.

VIDEO GENE LG 3003, 16K, + extra keys + sound box, built in cassette deck, software + magazines, sell for £200 ono. Telephone 01-946 1429.

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SEIKOSHA, GP80A PRINTER, as new, boxed, scarcely used, £130, negotiable. Tel: 01-552 1467 evenings.

59K CASED NASCOM, Nassys plus Nasbug, colour teletext graphics, Naspen, Zeap, Nasdis, Debug, Roms, Sargon plus chess, graphics, Xtal basic, extended colour command. New baby, so best offer. Tel: 051-327 4984.

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DRAGON 32 + £60 extras, 1 month old. Quick sale, £230 ono. Mr A. Mills, Flat C, 11 Agar Grove, London NW1.

DRAGON 32, + computer voice cassette, + books, 4 weeks old, £179.00. Tel: 01-661 1466.

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DRAGON 32, 2 months old, perfect condition, with cass leads and two Dragon data cass progs, £190. Tel: 0273 688859 (after 6 pm).

DRAGON 32, as new, 4 months old, inc cassette lead and over £30 of tapes + books, £180. Tel: Reading (0734) 690935 (after 6.30 pm).

T1994A, prog, language cartridge. Invaders cartridge, 4½ months old, worth £345, yours for £280 ono. A. Collier, Northwood (65) 22559.

SHARP MZ80K. 48K, plenty of programs including Space Invaders, Stark Trek, Doctor Livingstone etc. Also Zen assembler plus 2 extra manuals, £390 ono. Tel: 01-894 5455.

SHARP MZ80K, 48K, 4MHz hi-res graphics, green screen, software, includes basic fortran, forth, assembler and many games and books, £425 ono. Telephone: 01-316 1692.

BLACK AND WHITE MONITOR. Motor roller based screen, home-made casing, suitable for BBC, £50. Tel: Lee Valley 710764.

DRAGON 32, new, £160. Telephone 01-732 4777, Mr John Aldred.

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DAI COLOUR COMPUTER, 48K, 24K Basic, RS232, paddles, cassette, sound, £400 or swap for Atari 800. Bognor Regis (0243) 861066.

SONY C7 BETAMAX, recorder, six months old, swap for any computer (not Sinclair) to the value of £430 (second-hand). (Open to any offers — can offer cash.) Tel: 01-672 8376.

SHARP MZ 80K, 48K, as new with guarantee, £325. Tel: 051 638 3378.

TANGERINE COMPUTER, 16K Ram, two high res. boards, all options, Apple PSU keyboard + keypad, extended Basic, fully cased with fan, lots of software. Offers. Tel: 0483 31949.

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T1994/A THERMAL PRINTER for sale, offers over £150. H. Jones, Kerry, Wales (0686688) 502 (evenings and weekends).

SHARP PC1500, colour printer plotter + 8K Ram, one month old, hardly used, £279. Tel: 01-464 0845.

9" MONITOR, black and white, £20 ono. Tel: 01-301 4763.

8K PACK BASIC III, cassette deck, dust cover, manuals, games, boxed, £400 ono. Tel: 01-363 8901 (Nick).

VIC20 CARTRIDGE for exchange. Pirates Cove, Super Lander, Super Shot. Tel: 0438 811634 after 6 pm.

Wanted

SWAP VIC20 Adventure, Golden Baton, for Time-Machine or Arrow of Death or other Vic adventure. Phil McDonald, Bournemouth (0202) 682974.

WANTED. ZX Spectrum, 16K or 48K. John Ireland, Cardinooe (0492) 77439.

VIC20 SOFTWARE to swap. Star Battle cartridge plus Lair 16K Adventure for any CBM Adventure cartridge, except Private Cove, Harland, Aycliffe (0325) 316956.

SWAP. Adventure land cartridge for any other adventure. Tel: 0733-237101.

ZX SPECTRUM. Any K. Mr Holt. Tel: 061-794 5172 evenings.

ZX81, Sinclair built, 16K, power pack, leads, etc, full size moving key keyboard + software, £70. Tel: 01-301 1482, Mr. Sims, evenings.

SWAP VIC20. Audio genie, Tank Attack cartridge for any other Commodore cartridge. Tel: 0772 744439, after 5 pm.

ALIEN FOR NIGHTRACER or Super-slot. Phone 051-487 7840. Phone between 5.15 and 6.00 pm.

SWAP VIC20 Pirate Cove cartridge for another adventure. Tel: Stevenage (0438) 811634 (after 6 pm).

VIC20 OR SINCLAIR (possibly extras), locally. Tel: Bromsgrove 75225, Mr. Swan.

VIC20 + cassette deck. Will offer cash. Tel: 01-575 3779. Martin (evenings).

WANTED. ZX81, 16K, about £50. Tel: Arundel (0903) 883063 (evenings or weekends).

DRAGON OR SIMILAR, exchange musical instruments. Tel: Stephen, after 7 pm, Bradford 603500.

1 QUICKSILVA CHARACTER BOARD, any price considered. Tel: Gregory 0349 882026.

WANTED: 48K SPECTRUM. Mr. Toorad, 01-834 7743827 (daytime).

WANTED: VIC20, super expander or 3K Ram, or any other cartridges, in exchange for software. Tel: 01-888 0510, after 4 pm.

WANTED: TWO BOOKS from Melbourne House Publishers, *The Complete Sinclair ZX81 Basic Course*, *Machine Language Programming Made Simple*. Tel: 0271 64184.

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Beautiful programs

There is a German proverb which, roughly translated, says "Could everything be done twice, everything would be done better". What this boils down to is that it is easy to be wise after the event — hindsight is twenty-twenty!

In computing, I wonder if those critics who pontificate about this and that have ever produced an original work themselves. Aristotle wrote (in *Politics*) "They who are to be judges must also be performers".

This introduction is intended to set the stage for some critical comments of my own, about a program published in *Open Forum*. I am not going to say which issue — it was some time ago — or use the exact lines from the program, but I assure you that the program is no mirage. It is easy to knock with the experience of, hindsight, but as I have published programs myself for others to criticise (and they certainly have) perhaps I might be allowed a few observations.

The program was written by a ten-year-old child, which I think is very important. To have written a program of the complexity of that child's attempt, at the age of ten, is commendable. However, at that age it is very easy to get carried away with a program and it is difficult to hold oneself back.

When I was looking through the listing of the program, my attention was attracted to lines such as:

```
1000 IF T = A OR U = 1 THEN PROCBANG
1010 IF T = B OR U = 2 THEN PROCBANG
1020 IF T = C OR U = 3 THEN PROCBANG
1030 IF T = D OR U = 1 THEN PROCBANG
```

1040 IF T = E OR U = 2 THEN PROCBANG

There seemed to be a rather obvious regularity. The repetition consisted in the five *If* statements which all referred to the same procedure.

This repetition was compounded in my search to discover the nature of the variables *A* to *E*. The original assignments to the variables were contained in one line:

```
10 A = RND (9); B = RND (9); C = RND (9); D =
RND (9); E = RND (9)
```

The form was there for all to see. All the five variables *A* to *E* were the same, though of different value.

When faced with such a display of repetition, it is difficult to understand why it was not exploited in some way when the program was written. The reason of course is that form and symmetry are in the eye of the beholder — and such an eye is sharpened by hindsight. The ten-year-old in question obviously did not see the program as a whole, just as a collection of parts.

So what is wrong with that? Nothing, except it is a very inefficient way of programming.

The aforementioned program could be improved by finding a way of coping with variables which are the same, yet can take different values:

```
5 DIM VAR(5)
10 FOR I = 1 TO 5:VAR(I) = RND(9):NEXT I
```

When we come to the *If* statements, we can see that the numbers to which *U* is compared have a logical pattern. So we can write:

```
1000 FOR I = 1 TO 5
1010 IF T = VAR(I) OR U = 1 - INT((I - 1)/3) + 3
THEN PROCBANG
1020 NEXT I
```

Sad to say, however, as far as the routine programming one tends to see published is concerned, both the use of arrays (dimensioned variables) and modular (or clock) arithmetic is rare.

The potential saving in programming space is considerable though. The amount to which we can economise depends on the way we approach programming. Beauty is all!

Boris Allan

Puzzle

A's down

Puzzle No 36

	1	2
3	4	
5		

Across: 1. $A - B$; 3. $A * B$; 5. A^2 .
Down: 1. B^2 ; 2. $8B$; 3. B ; 4. $A - B$.

Solution to Puzzle No 32

This algorithm produces Pascal's triangle. The number of families in each cave is given by the sum of the numbers of families in the two adjacent caves immediately above.

	1	Row 0
	1 1	Row 1
	1 2 1	Row 2
	1 3 3 1	Row 3
	1 4 6 4 1	Row 4
	1 5 10 10 5 1	Row 5

The numbers in the rows correspond to terms in the Binomial expansion $(a + x)^n$. For example, to find the terms in the fifth row we expand: $(a + x)^5 = 1a^5 + 5a^4x + 10a^3x^2 + 10a^2x^3 + 5ax^4 + 1x^5$.

The numbers in front of the terms (called the coefficients) give the numbers of families at each level of the cave system.

The sum of the coefficients in each row gives the probability of successive tossing of a coin producing a head (or a tail) repeatedly. For example — what is the probability of getting four heads in four tossings? Look at the fourth row of the triangle. $1 + 4 + 6 + 4 + 1 = 16$ — so the probability is 1 in 16.

Winner of Puzzle No 32

The winner is: W R Masfield, Slade Road, Holland-on-Sea, Essex, who receives £10.

Top 10

- Atari**
- 1(1) Preppie (Adventure International)
 - 2(7) Scott Adams Adventures (Adventure International)
 - 3(4) Air Strike (English Software)
 - 4(2) Jumbo Jet Pilot (Thorn EMI)
 - 5(3) Submarine Commander (Thorn EMI)
 - 6(5) Snooker and Billiards (Thorn EMI)
 - 7(-) Hell Cat Ace (Microprose Software)
 - 8(-) War (Adventure International)
 - 9(-) Soccer (Thorn EMI)
 - 10(-) Snooper Troops 1 (Spinnaker)
- *Cartridge. †Disc.
(Figures compiled by Calisto Computers, Birmingham 021 632 6458)

- ZX81***
- 1(3) Frogger (D.J.L. Software)
 - 2(2) 3D Defender (JK Greye)
 - 3(1) Mazogs (Bug-Byte)
 - 4(4) Mazeman (Abbersoft)
 - 5(5) Gulp II (Campbell Systems)
 - 6(6) Gauntlet (Colourmatic)
 - 7(7) Flight Simulation (Psion)
 - 8(8) Adventure 1 (Abbersoft)
 - 9(-) 3D Monster Maze (JK Greye)
 - 10(9) Chess (Artic)
- *All 16K.
(Figures supplied by Buffer Micro Shop, London 01-769 2887)

- Spectrum**
- 1(1) Time Gate (Quicksilva)
 - 2(-) Spectres (Bug-Byte)
 - 3(3) Escape (New Generation)
 - 4(2) Orbiter (Silvasoft)
 - 5(6) Adventure 1 (Abbersoft)
 - 6(8) Football Manager (Addictive Games)
 - 7(10) Master File (Campbell Systems)
 - 8(7) Espionage Island (Artic)
 - 9(-) Night File (Hewson)
 - 10(-) Gulpman (Campbell Systems)
- *Requires 48K.
(Figures compiled by Buffer Micro Shop, London 01-769 2887)

- Vic20**
- 1(3) Traxx (Llamasoft)
 - 2(5) Sargon II Chess (Commodore)
 - 3(7) Jellymonsters (Commodore)
 - 4(2) Defenda (Llamasoft)
 - 5(1) Grid Runner (Llamasoft)
 - 6(4) Abductor (Llamasoft)
 - 7(9) Myriad (Rabbit)
 - 8(9) Blitz (Commodore)
 - 9(6) Adventureland (Commodore)
 - 10-(10) Spiders of Mars (Audiogenic)
- *(-) Voodoo Castle (Commodore)
(Figures compiled by the Vic Centre, London 01-992 9904)

- Books**
- 1(1) Spectrum Machine Language for the Absolute Beginner, Tang (Melbourne House)
 - 2(5) ZX Spectrum Explored, Hartnell (Sinclair/Browne)
 - 3(-) Assembly Language Programming for the BBC Micro, Birnbaum (Macmillan)
 - 4(-) BBC Micro Revealed, Ruston (Interface)
 - 5(-) The Spectrum Handbook, Langdell (Century)
 - 6(-) Programming the 6502, Zaks (Sybex)
 - 7(-) 35 Programs for the Dragon 32, Langdell (Century)
 - 8(-) Over the Spectrum, various authors (Melbourne House)
 - 9(6) Machine Code and Better Basic, Stewart and Jones (Shiva)
 - 10(-) Programming the Z80, Zaks (Sybex)
- (Figures compiled by Watford Technical Books, Watford, 0923 23324)
(Last week's position in brackets)

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